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ABSTRACT

This report summarizes the third phase of the Telecommunications Information Network (TIN), which provides a telecommunications link between four remote southwest Ohio hospitals and the University of Cincinnati Medical Center, thereby reducing the isolation of healthcare providers at the remote hospitals. A description of the system explains the service, in which (1) requests for information from the site hospitals are telephoned to the Medical Center's Health Sciences Library or Drug and Poison Information Center; (2) staff professionals from these areas research each question using available resources; and (3) responses are transmitted orally, via telephone, and/or visually, via slow-scan television. The start-up, trial-operations, demonstration phases, and the projected operational phase are then described; project benefits are assessed; and the barriers to implementation and utilization are analyzed. Plans for institutionalization and barriers to full implementation are also discussed. The final section focuses on costing and financial information. References are listed, and appendices include a summary of the evolution of the TIN slow-scan system, several issues of a project newsletter, a script for a telecommunications slide-tape presentation, TIN miniposters, and a list of project-related presentations and publications. (LMM)

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University of Cincinnati

Medical Center

FINAL REPORT

on

Telecommunications Information Network: A Model for On-demand Transfer of Medical Information

(DHEW 041A-7901)

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A. STATUS OF PROJECT

A.1 INTRODUCTION

The Telecommunications Information Network (TIN) Demonstration Project is concluding its third phase. The project has been in existence since December, 1978, with the major goal of providing a telecommunications link between four remote hospitals and the University of Cincinnati Medical Center. The purpose of this link is to reduce the isolation of health-care providers at the remote hospitals by making available the information resources of a major medical center. Requests for information from health-care providers at the site hospitals are telephoned to either of two access points at the Medical Center (the Health Sciences Library or the Drug and Poison Information Center). Staff professionals from these areas research each question using available resources. Responses are transmitted orally, via telephone, and/or visually, via slow-scan television.

The TIN project is scheduled to complete its third stage when federal funding concludes (April 15, 1981). Figure A.1.1 illustrates the major activities of the project during its various stages. A detailed description and analysis of each of these activities is discussed in the following sections.

A.2 START-UP PHASE

In anticipation of the commencement of federal funding the search for a project director and purchase of equipment were begun prior to December 15, 1978 (the starting date of the project grant). The project director began January 22, 1978. Equipment was ordered from the end of November to the middle of December, 1978.

From the onset of funding until March 1, 1979 the various other start-up activities (development of a research methodology, searches for project librarian and staff assistant, development of the project review committee, agreements with hospitals and staff training) were implemented.

This phase was marked by a flurry of activity aimed at making the project operational as quickly as possible. In addition to the activities listed in Figure A.1.1, the new project staff was undergoing an orientation to the Medical Center Libraries and the project proposal. There were frequent meetings between the project staff and other individuals and groups affiliated with, or affected by, the project.

As part of the process of setting-up the Telecommunications Information Network (TIN), the original project proposal was reviewed by the project staff and others. The review revealed problems with the technical design of the network and raised several questions not addressed in the proposal. (See Appendix A for an explanation of the technical design changes.) These questions and technical problems delayed the Trial Operations Phase of the project until June, 1979. (The details of these problems and how they

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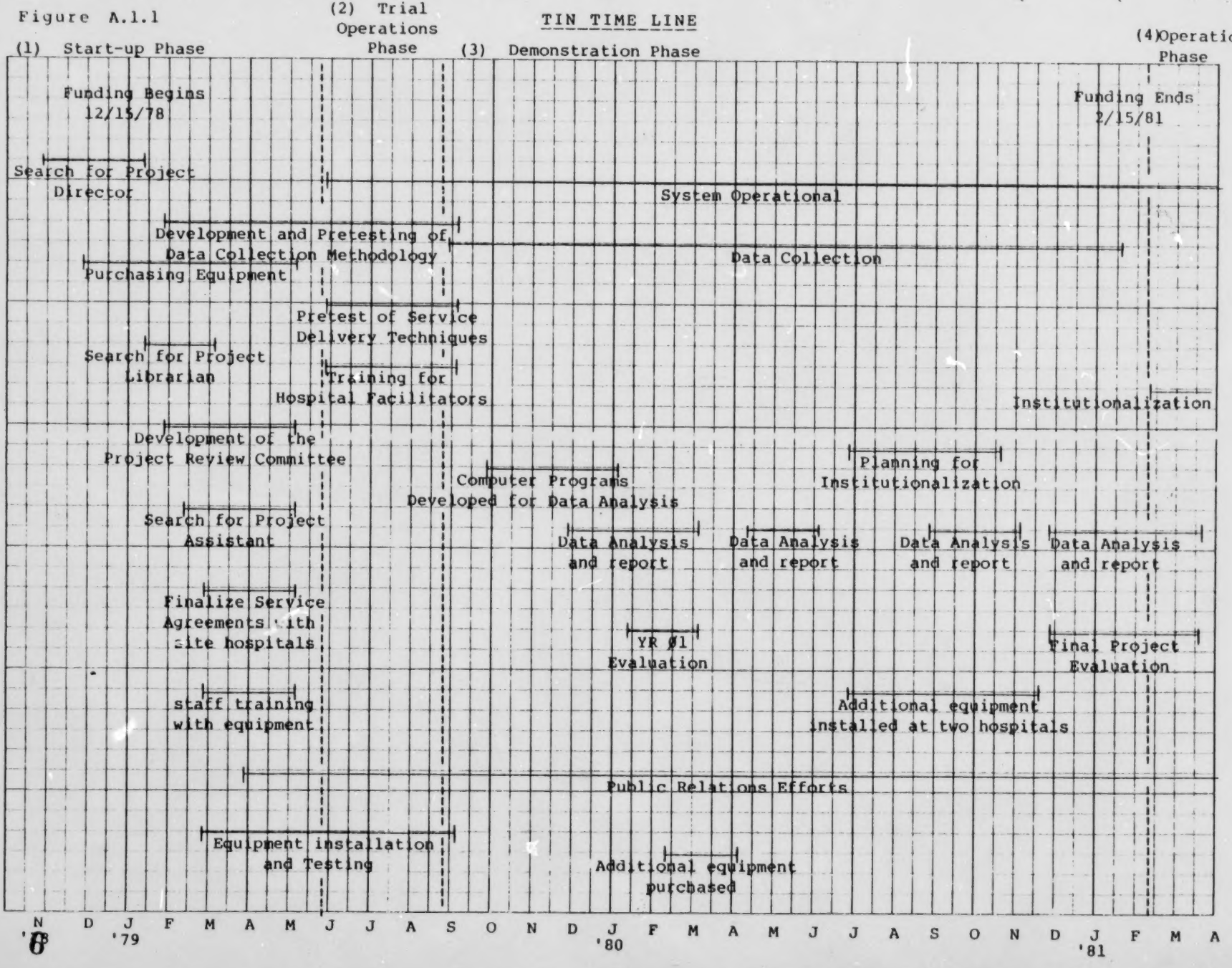
Figure A.1.1

TIN TIME LINE


(1) Start-up Phase
(2) Trial Operations Phase
(3) Demonstration Phase
(4) Operational Phase
Funding Begins 12/15/78
Funding Ends 2/15/81
Search for Project Director
System Operational
Development and Pretesting of Data Collection Methodology
Data Collection
Purchasing Equipment
Pretest of Service Delivery Techniques
Search for Project Librarian
Training for Hospital Facilitators
Institutionalization
Development of the Project Review Committee
Planning for Institutionalization
Computer Programs Developed for Data Analysis
Search for Project Assistant
Data Analysis and report
Data Analysis and report
Data Analysis and report
Data Analysis and report
Finalize Service Agreements with site hospitals
YR #1 Evaluation
Final Project Evaluation
staff training with equipment
Additional equipment installed at two hospitals
Public Relations Efforts
Equipment installation and Testing
Additional equipment purchased
N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A
'78 '79 '80 '81

were dealt with are discussed elsewhere in this report.) The Start-Up Phase was considered ended when all project staff had been hired and oriented, all major equipment purchases were complete, and working relationships had been established with site hospital administrators and project review committee members.

A.3 TRIAL OPERATIONS PHASE

This second phase of the TIN project was approximately a 90-day period from June to September, 1979. Most of this time was dedicated to testing the network including the equipment, service delivery techniques and research methodology. Several minor modifications were made to better integrate the network into existing organizational practices. During this period the Project Review Committee met several times to develop policies regarding the use of the Telecommunications Information Network.

At each hospital site an individual was selected, with the help of administrators, as a gatekeeper or facilitator. The facilitators were trained in the use of the slow-scan equipment and they became an important part of project public relations efforts. They provided potential TIN users with information about the network and most questions were directed through them. The training of these facilitators became crucial to later functioning of TIN.

A.4 DEMONSTRATION PHASE

The Demonstration Phase of this project began September 1, 1979. At this time all previously established policies became effective and formal data collection began. Program changes developed in the trial operations phase were incorporated into the proposal for YR 02 funding. Additional equipment was purchased and integrated into the existing network. The network also expanded to include extension monitors and auto-answering systems at two of the hospitals. These equipment changes took place from July to November, 1980.

A system of quarterly reports was instituted to keep the project staff, hospital administrators, facilitators, and Project Review Committee abreast of system use. These reports provided information on, among other things, the number of requests, the type of user (e.g. physician, nurse, pharmacist), who researched the question (i.e., Medical Center Libraries, Drug and Poison Information Center), and whether slow-scan television was used in the response. Computer programs were developed to store the data, perform statistical analyses, and generate reports. (Details of the data analysis are discussed elsewhere in this report).

During the demonstration phase the project staff met frequently to discuss the institution-obligation of TIN. Various plans involving cost sharing and future grant funds were evaluated. Contacts were made with individuals and organizations who had expressed an interest in the network in an effort to determine the feasibility of expanding TIN.

A.5 OPERATIONAL PHASE

The Operational Phase represents a level of operation which is self-supporting and adopted by local or other service organizations. Although this project has not yet reached this stage of developement, it is anticipated that an Operational Phase will begin shortly after the conclusion of this federal grant. The service has been widely utilized by health-care providers at the hospital sites and other institutions have expressed a desire to join the network. The details of an operational system, however, remain to be worked out. Some of the issues that must be addressed are:

- Which services currently offered through TIN are most valued by end users?
- Which services would end users be willing to pay for?
- How are costs to be calculated and who pays for the service?
- What additional services would end users like to see established?
- What criteria should be used to admit new user organizations into the network and what criteria should be used for terminating a user organization?

It is impossible to predict the future of TIN without the answers to these and other questions. Although the Demonstration Phase has yielded useful data on the use and attitude toward the present network, the interjection of cost is likely to have a major effect on its future success.

B. ASSESSMENT OF BENEFITS OF PROJECT

B.1 PROJECT BENEFICIARIES

The Telecommunications Information Network services health-care providers at four remote hospitals in southwest Ohio. The hospitals were chosen because they typify the variety of hospitals in the United States and because they identified a need for the services provided. They range in distance from 15 to 50 miles from the University of Cincinnati Medical Center and in size from 63 to 340 beds. TIN services a total of more than 2,500 physicians, nurses, pharmacists, technicians, therapists, and administrators at the four sites.

Services are provided mainly by medical librarians (at the Health Sciences Library) and content specialists in Pharmacy and Pharmacology (at the Drug and Poison Information Center). When needed, service providers use the more than 900 Medical Center faculty as consultants within specialty areas.

There are both direct and indirect beneficiaries of the Telecommunications Information Network. The direct beneficiaries consist of the health care professionals at the four site hospitals affiliated with this project. Patients at these hospitals are considered the indirect beneficiaries since most of the requests were made to aid in patient care.

This project was originally designed to respond to quick, patient care-related questions from front line health-care providers. It was anticipated that these questions could be answered within minutes and the information would be used immediately by a physician, nurse, pharmacist, or technician. Data from this project show a somewhat more eclectic user group with a correspondingly wider range of questions. Although physicians and pharmacists constitute the largest user groups, the network received requests from a wide variety of hospital personnel (Table B.1.1). The large number of users in the "other" category consisted mainly of medical technicians and emergency room personnel.

The Telecommunications Information Network was used for purposes other than patient care information, which was intended to be its primary function (Table B.1.2). The use of the requested information was determined for 56 percent of TIN questions (N=273.) Direct patient care questions accounted for less than one-third while personal knowledge, research, and administration were responsible for 26.7%, 15.4%, and 15.0%, respectively.

One of the objectives for the second year of this project was to expand the number of beneficiaries by linking TIN with similar slow-scan based information networks in this country. This proposal would have provided users of other networks with access to TIN. Because of technological incompatibilities and time constraints this objective could not be met.

Table B.1.1

TIN USERS

POSITION OF USER	NUMBER	PERCENT
Patient	1	0.2
Other Therapist	4	0.8
Respiratory Therapist	6	1.3
Nursing Supervisor	8	1.7
Physical Therapist	9	1.9
In Service Director	14	3.0
Administrator	20	4.2
Nurse	45	9.6
Librarian	52	11.0
Pharmacist	93	19.7
Physician	105	22.3
Other	114	24.2
TOTAL	471	100.0

Table B.1.2

USES OF TIN REQUESTED INFORMATION

	NUMBER	PERCENT
Patient Treatment	86	31.5
Personal Knowledge	73	26.7
Research	42	15.4
Administration	41	15.0
Teaching	18	6.6
Other	13	4.8
TOTAL	273	100.0

B.2 NEEDS ASSESSMENT

The needs assessment for this project was accomplished in a somewhat unorthodox manner. It was unnecessary to design a needs assessment instrument for data collection for this project as other researchers have already identified the need for remote access to information resources. The problem of isolation for the rural health-care practitioner is well documented (Oseasohn et al., 1971; Parker and Sorensen, 1978; Bible, 1975; Leyasmeyer, 1976). Cordes, in a survey of rural physicians' opinions about their practices, found that "medical isolation" is one of the most frustrating aspects of rural practice (1978).

In addition to the above mentioned documentation of the need for informational resources, Medical Center contacts with area hospitals, including the four remote hospitals, revealed the inadequacies of many hospital libraries. An earlier project also investigated the utility of a telecommunications medium to transfer on-demand drug information to health-care providers within the University of Cincinnati Medical Center and several affiliated institutions (NLM 5 R01 LM 02350).

B.3 PRE-PROJECT INFORMATION SEEKING BEHAVIOR

There is very little documentation of the information seeking behavior of the project participants prior to the availability of TIN services. Evidence suggests, however, that there were three basic scenarios for answering their questions. In one scenario the health-care provider asks available colleagues for information. If this method does not yield an acceptable answer, the provider is likely to make a decision based on available information and intuition. In patient care situations this may result in inferior health-care if the most current information is not located.

In the second scenario the information seeker uses readily available written resources (e.g., reference books, hospital and personal libraries). These resources are generally considered after those in scenario one are exhausted. Often these resources are also inadequate and the health-care providers must decide to act with limited information or utilize other information resources.

In the third scenario the health-care provider tries to gather pertinent information through available interlibrary loan networks. This method presented two draw-backs: 1) it depends on the information seeker supplying specific titles of needed information, often achieved only through use of an on-line bibliographic search which is unavailable at the four site hospitals, and 2) it results in a lengthy delay which may be unacceptable to the information seeker.

These scenarios were developed through observation and conversations with health-care providers. It is not known to what extent each of the scenarios is used at the different hospitals.

B.4 GAINS AND LOSSES OF PROJECT METHODOLOGY AND TECHNOLOGY

There are several identifiable advantages of the methodology and technology used for this project. These include:

- The TIN project provided a more structured network between the site hospitals and the Medical Center. Previous information networks were generally informal and unstructured, providing a relatively unstable resource.

- The TIN project provided rapid visual information (e.g., journal articles, segment from monographs and reports) via slow-scan television. This is a significant improvement over the interlibrary loan system previously used for printed information.

- This project provided easy access to information specialists. This reduces the costly amount of time information seekers spend attempting to locate various resources.

- The TIN project uses slow-scan television which transmits visual information via telephone lines. The technology in previous information network projects used real-time television which was limited to a relatively small geographic area. Slow-scan, which is less expensive than real-time, can transmit to any location which can be reached by telephone.

B.5 PROJECT POTENTIAL

The TIN resources are available to over 2,500 health-care providers at the four remote hospitals. From September, 1979 through January, 1981, 487 requests for information were researched through TIN (Figure B.5.1). Many TIN patrons became frequent users. The amount of time to receive, research, and relay requested information is approximately 2 hours. Currently TIN receives almost 6 requests per 40 hour work week. This requires approximately 12 hours (.3 FTE) of professional time. With an additional 2 hours a day for administrative work related to the project, there is a potential of 16 hours of information specialist time available to research up to 8 additional questions weekly. This time is presently occupied by project research and evaluation which will be reduced when the federal funding period is ended.

With the additional time and current staffing levels (1 FTE library researcher and .5 FTE clerical staff), the network could expand to include up to five more hospitals. With similar hospital staff sizes this would increase the service population to more than 5,800 health-care providers. This would require funding for telecommunications equipment for each hospital and the salary of a professional librarian. Only the staff salary, telephone lines, and equipment maintenance are a continuing cost.

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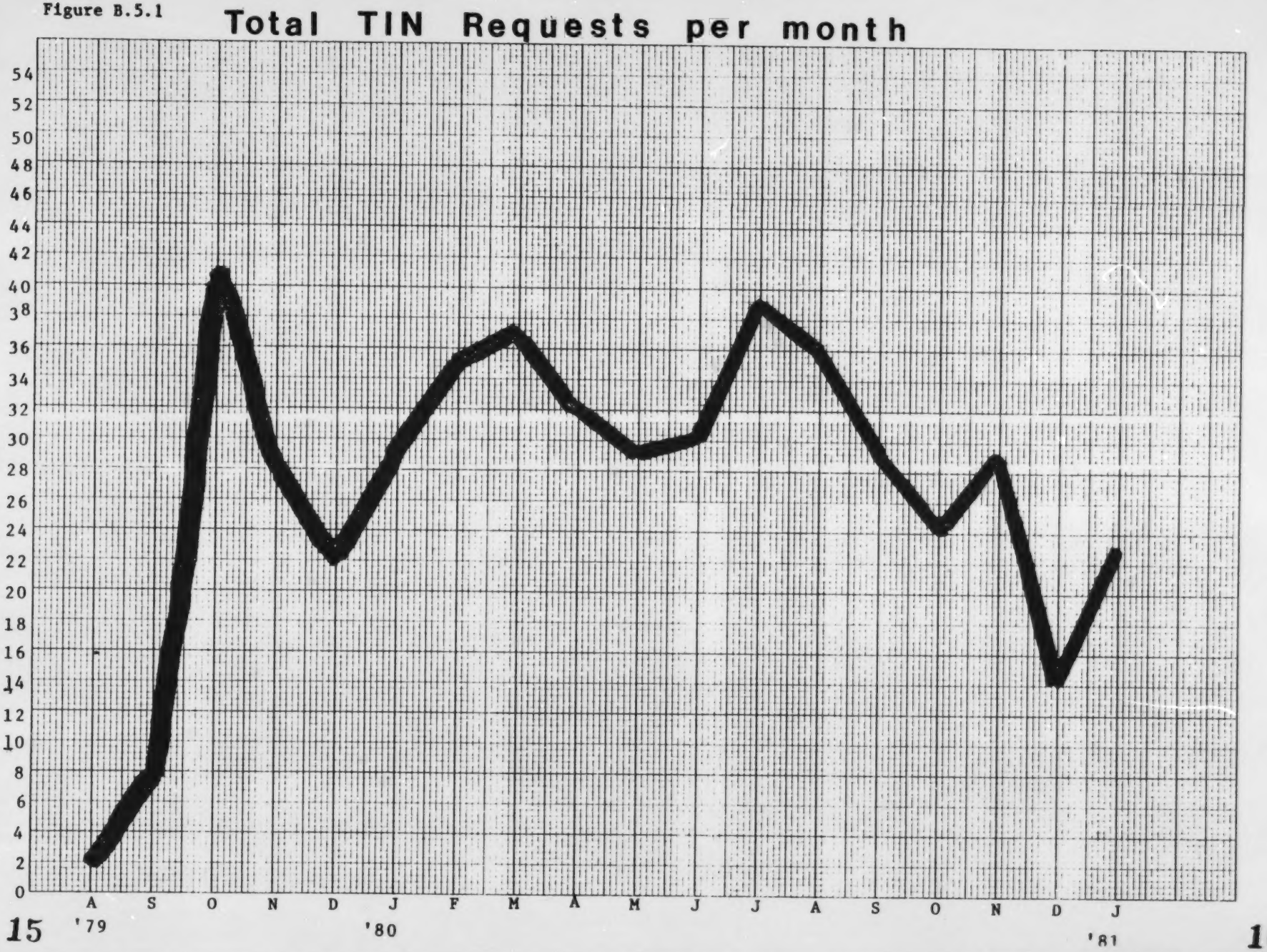
Figure B.5.1



The ultimate target population is all rural and isolated health-care providers. This, of course, is possible because of the easy access potential of slow-scan television. This size network would, however, necessarily be large and complex. A more reasonable target population would be the rural and isolated health-care providers in southwest Ohio, southeast Indiana and northern Kentucky. This might include an additional 10 to 12 hospitals and perhaps as many as 10,000 health-care providers.

B.6 COMPARISON OF TECHNOLOGIES AND SERVICES

There are a variety of existing technologies which could conceivably support similar information networks. The major considerations in comparing these technologies are: cost, speed, visual images, and interactive versus non-interactive capabilities. Some of the current technologies for information transfer are: mail, telephone, slow-scan television, real-time television, telefacsimile, and electronic mail.

Real-time television is undoubtably the most costly to develop and maintain. It requires expensive transmission equipment as well as a variety of technicians to maintain the network. Slow-scan television, telefacsimile, and electronic mail represent a middle cost range. These technologies rely chiefly on existing telephone lines for transmitting information and the end instruments account for most of the operational costs. Most of these technologies are "turn key" systems that require minimal technical assistance to operate. The U.S. postal system and telephone represent the least expensive methods for information transfer since each relies on existing communication networks.

All of the information transfer methodologies, with the notable exception of the U.S. Postal Service, have the potential to provide instantaneous communication. The difference between these technologies is measured in seconds while the U.S. mail generally takes several days to deliver information.

Several of the new technologies provide visual images (slow-scan television, real-time television, and electronic mail); others provide hard copies (U.S. mail, telefacsimile, and some forms of electronic mail) while the telephone provides only voice transfer of information. The need for visual images and the type of images being transmitted (print versus non-print information) often dictate the use of certain technologies. If, for example, the information being transferred is in the form of an x-ray or photographic slide, several technologies prove inadequate.

Most information networks require interaction between two or more users and/or providers. If this interaction takes the form of a conversation, the telephone, often coupled with slow-scan or real-time television, is the optimal technology. Other technologies (electronic mail and telefacsimile) allow for interactive communication at a more protracted level.

Every network must weigh its needs against the costs and availability of optimal technologies in deciding on the appropriate linking mechanism for information transfer. The Telecommunications Information Network chose slow-scan because a visual image was necessary and quick information transfer plus low cost were high priorities. After two years of experience the network has evolved to where the primary information being transferred is the printed page, mostly from journals. The network users generally need the information within 24 to 48 hours and there is less need for the technology to be interactive.

The ideal technology for this network is not currently on the market. The optimal piece of equipment would operate very similar to a telefacsimile unit in that it transmits printed material with high resolution. In addition, it must be capable of transmitting pages from bound journals and monographs. This last requirement was not found in a survey of current telefacsimile manufacturers. To use existing telefacsimile equipment in this network, photostatic copies must be made of each item to be transmitted. There is a noticeable degradation in most copies. The degraded copies would be transmitted to a receiving site via telefacsimile. There is also noticeable degradation in this process. The information seeker receives a third generation copy that may not be legible and the network staff has an unneeded photostatic duplicate of the material.

B.7 EXPECTED PROJECT BENEFITS

The major expected benefits for this project were:

- To make the information resources of the University of Cincinnati Medical Center available to the health-care providers at the four remote hospitals.
- To facilitate information seeking behavior among isolated health-care providers.
- To promote the use of existing information transfer methods (i.e., interlibrary loan) when appropriate.
- To create closer relationships between the University of Cincinnati Medical Center and the four remote hospitals.
- To develop a self-supporting information network which provides information services to isolated hospitals.
- To work with the Area Health Education Center (AHEC) in providing educational resources for medical and allied health students from the University of Cincinnati who are participating in rural internships or clerkships in rural areas.
- To develop data on the information seeking behavior of rural and isolated health-care providers.
- To determine the cost-effectiveness of providing TIN services on an on-going basis to rural hospitals.

B.8 ACTUAL MAJOR BENEFITS

The actual benefits of this project include:

- Creating and maintaining an information network between the four remote hospitals and the University of Cincinnati Medical Center.

This structured communications link helps organize and coordinate the resources of the University of Cincinnati Medical Center and provides information seekers with an uncomplicated access to these resources. Previously, information seekers found themselves in a maze when trying to search for information through the University of Cincinnati Medical Center. There was no mechanism for coordinating Medical Center resources and the Medical Center Libraries did not have specific programs for working directly with health-care providers in remote areas.

- Increasing the use of the Interlibrary Loan (ILL) Network at site hospitals.

It was expected that if the Telecommunications Information Network was successful, health-care providers would increase their information seeking behavior. One indication of this behavior is the use of the existing Interlibrary Loan (ILL) Network. This network sends requested materials (or photostatic copies) to individuals via U.S. mail. All of the site hospitals in this project had access to Medical Center Libraries' materials through ILL prior to the TIN project. Table B.8.1 shows the use of ILL before and during this project. Two hospitals, Clermont County and Mercy North, show significant increases in the use of the ILL network. Only one hospital, Brown county, shows a slight drop in its statistics.

Table B.8.1 Interlibrary Loan (ILL) Statistics for Site Hospitals

	Apr.'78 - Mar.'79		Apr.'79 - Mar.'80		Apr.'80 - Jan.'81	
	Total	Aver./Month	Total	Aver./Month	Total	Aver./Month
Bethesda North	0*		70	5.8	62	6.9
Brown County	23	1.9	15	1.3	12	1.3
Clermont County	0	0	15	1.3	11	1.2
Mercy North	55	4.6	65	5.4	60	6.7

* In the 1978-79 period, all interlibrary loan requests from Bethesda North Hospital were processed through their base hospital.

- An increased awareness of the resources of the University of Cincinnati Medical Center by users of the Telecommunications Information Network.

  This was accomplished as health-care providers used TIN. In general, system users were made aware of the resources the project staff used in responding to a request.

- An increased interest by the Medical Center's faculty and administration in using telecommunications to create and maintain links with other outlying health-care facilities.

The capabilities of the Telecommunications Information Network and slow-scan television have been discussed with several faculty and administrators. Currently there are plans to work with the Department of Internal Medicine to extend the network to other hospitals. The Drug and Poison Information Center is also planning a slow-scan link with other drug and poison centers in Ohio. See Section E. Dissemination for further details.

- Development of the Telecommunications Information Network (i.e., slow-scan television) as a tool for use by the Information Access Division of the Medical Center Libraries in providing information to the sample hospitals. This institutionalization of TIN will insure its continued success.

The Telecommunications Information Network is being offered to hospitals on a fee-for-service basis. Details of these plans are discussed in Section D. Strategies for Institutionalization.

- Development of an extensive database to study usage patterns and to identify future directions of telecommunications in providing on-demand information in the health-care field.

Data was collected on each TIN request during the Demonstration Phase of this project. The data was computerized and statistical methods were applied to obtain a better understanding of the informational needs of health-care providers at the remote hospital sites. Analysis of the data will continue and the results will be presented at professional meetings and in appropriate publications.

- A better understanding of telecommunications technology, its benefits, drawbacks, and applications.

The experience of working with a new technology in an unexplored area is responsible for the discovery of many benefits and problems with both services and technology. The services began as a quick on-demand information network designed to provide answers to specific questions relating to patient care. This evolved into a network which responds to in-depth research questions within a larger time-frame (24 to 48 hours). The questions are also much more divergent than originally anticipated. The responses were generally in the form of printed material and slow-scan television is capable of transmitting only small sections of print. Most of the problems were overcome (see Section C. Barriers to Implementation and Utilization) and the system adapted to the needs of the users.

C. BARRIERS TO IMPLEMENTATION AND UTILIZATIONS

C.1 TECHNICAL BARRIERS

There were few actual technical problems with the Telecommunications Information Network; however, those that did exist probably had a sizeable effect on system use. These problems affected both system providers and users.

Telephone Service - Telephone installation was a major barrier at the four site hospitals. Difficulties were encountered in both obtaining the proper equipment and having it installed correctly. These problems were compounded by the fact that we were dealing with two phone companies. These installation problems created delays in establishing the system and implementing the network. Problems were also encountered when equipment was moved and lines were replaced only after long delays; when lines were damaged through other changes being made in the hospital phone system; and when data couplers had to be purchased and installed independent of the phone company for establishment of secondary monitor sites at two site hospitals.

Slow-Scan Television - The major problem with the slow-scan equipment was the amount of material that could be successfully transmitted. The slow-scan equipment utilized in the network (Colorado Video Incorporated Models 260B, 275, and 280) transmits printed material which can appear legibly at the receiving site. Two or three paragraphs from a standard journal page is the maximum amount of material that may be transmitted. This limitation necessitated multiple transmissions and copies for the sites with hard-copy video printers and also made it impossible to transmit wide pages of material. In satisfying requests, material had to be selected not only for the quality of the information it contained, but also for its transmitting suitability.

The Colorado Video, Inc. equipment transmits and receives from left to right across the video screen. This requires the user to wait until the transmission is complete before the material may be read. An attempt was made to correct this problem by placing the video monitors on their sides and transmitting the material so that it could be read as each line appeared. This positioning proved awkward in both sending and receiving procedures and the equipment was returned to its original position after a trial month.

A minor problem was encountered when attempting to transmit information from journals using glossy paper. The shine was often reflected in a horizontal line through the material which necessitated retransmission after lighting had been changed.

Another problem was in the amount of time that was required per transmission. Although only 75 seconds is required for material to appear on the video monitors at the receiving sites, the set-up time for transmission increased response time considerably. Set-up time included turning pages and altering camera focus. This delay was decreased drastically when a freeze-frame capability was made available for transmission,

allowing one picture to be sent while another was being prepared. However, some users still responded impatiently to the delay time necessary in readying equipment and transmitting material.

Hard-copy Printers - Two hospitals (Brown County General Hospital and Mercy Hospital) were supplied with hard-copy video printers (Tektronix Model 4632). Two problems were associated with the printers although neither seemed to diminish the amount of usage. The printer must be "warmed up" for a minimum of twenty minutes which often created unacceptable delays in transmission. An electronic timer was then installed at each printer site which automatically turned the printer on each morning and off each evening. The second problem which cannot be dealt with as easily is that the copies are of poor quality. This illegibility can be alleviated somewhat by replacing paper before it becomes cloudy with age (approximately 6 to 9 months), but fresh copies were still often inadequate.

C.2 MARKETING TIN SERVICES

Lack of awareness of the system and the fear of something new and different were major obstacles the Telecommunications Information Network had to overcome. The marketing strategy for TIN was one of the most important aspects of the network. The Public Relations Committee was one of the first TIN committees formed and addressed its efforts to three audiences: the four site hospitals, the U.C. Medical Center, and the general public.

The Telecommunications Information Network staff, the Drug and Poison Information Center staff, and facilitators worked together in their public relations efforts at the hospital sites. The facilitators act as on-site information sources regarding the Telecommunications Information Network. The facilitators also frequently act as intermediaries by relaying questions from other health professionals. The facilitators at Mercy Hospital and Bethesda North are also the hospital librarians and are therefore already involved in assisting health-care providers to attain information. The Education Coordinator is in a similar position as facilitator at Brown County General Hospital. A pharmacist at Clermont County Hospital is the facilitator there.

Upon verification of funding for this project, press releases were distributed to the local newspapers. Articles appeared in Cincinnati newspapers as well as in local newspapers at the site hospital communities. The Public Relations Committee developed a project logo to identify the Telecommunications Information Network on all its publications (Figure C.2.1). Large posters distributed at each hospital had the name of the facilitator and the location of the TIN equipment for the site hospital (Figure C.2.2). A newsletter is published by the Public Relations Committee approximately every three months (see Appendix B).

A general reception and demonstration was held for the inauguration of the Telecommunications Information Network on May 3, 1979. Invitations were sent to over 100 representatives of the University of Cincinnati, the four site hospitals, and other interested parties. Two local radio stations aired an interview with the Project Director in association with the initiation of the Telecommunications Information Network.

A fifteen-minute slide-tape program was produced by the Telecommunications Information Network for use at on-site demonstrations and for general information purposes. It has been frequently used for various in-service programs and medical staff presentations at the four hospital sites (see Appendix C). Smaller posters (8½" x 11") were distributed regularly to each of the hospitals. These "mini-posters" reflected possible questions that could be referred to TIN. The posters were humorous to attract the attention of potential users (see Appendix D).

A brochure describing the Telecommunications Information Network and its services was developed for distribution to health professionals at both the U.C. Medical Center and the four site hospitals (Figure C.2.3).

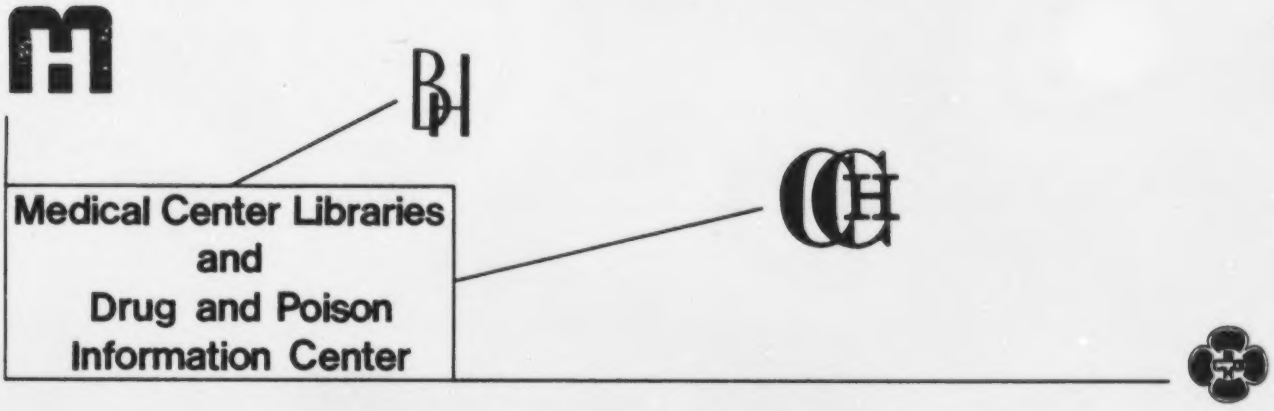
Figure C.2.1

Each hospital was visited on an average of once a month. On these visits, Telecommunications Information Network staff members talk with the facilitators, physicians, nurses, hospital administrators, librarians, and other health professionals to encourage them to make use of the system.

C.3 COLLABORATION

Collaboration with other institutions providing similar telecommunications and information services occurred in two ways. The first type of collaboration was the use of previously established networks for information transfer. As the major medical library for southwestern Ohio, the University of Cincinnati Medical Center Libraries is a major participant in local, regional, and national information networks. These networks were often used as resources for gathering information relevant to TIN requests. The collaboration in this case was indirect and unintentional since the other network participants were not actively involved in providing direct service to TIN users.

FffAST INFORMATION IS ONLY A SLOW SCAN AWAY!



The University of Cincinnati Medical Center Libraries can put you in touch with:

- current medical information
- drug information
- consultants in specialty fields

(Hospital facilitator)

(Location of Telecommunications Information Network equipment)

(Actual size of poster: 22" x 17")

A grant project funded by the Office of Telecommunications, Department of Health, Education, & Welfare.

What is the Telecommunications Information Network (TIN)?

A system providing access to information resources at the University of Cincinnati Medical Center to answer your health-care questions via slow-scan television.

What is slow-scan television?

A new technology which transmits still images over telephone lines. In less than 1½ minutes you can receive pictures of printed material, X-rays, slides, 3-D models . . .

Who can use TIN?

Any person involved in health-care at the four hospitals associated with the network.

Medical Center Libraries and Drug and Poison Information Center	Mercy Hospital Clermont County Hospital Brown County General Hospital Bethesda North Hospital

What kind of questions can I ask TIN?

Any question concerning health care.

Who answers the questions?

Information specialists at both the Medical Center Libraries and the Drug and Poison Information Center. U.C. medical specialists are also available as information resources for TIN.

How do I use TIN?

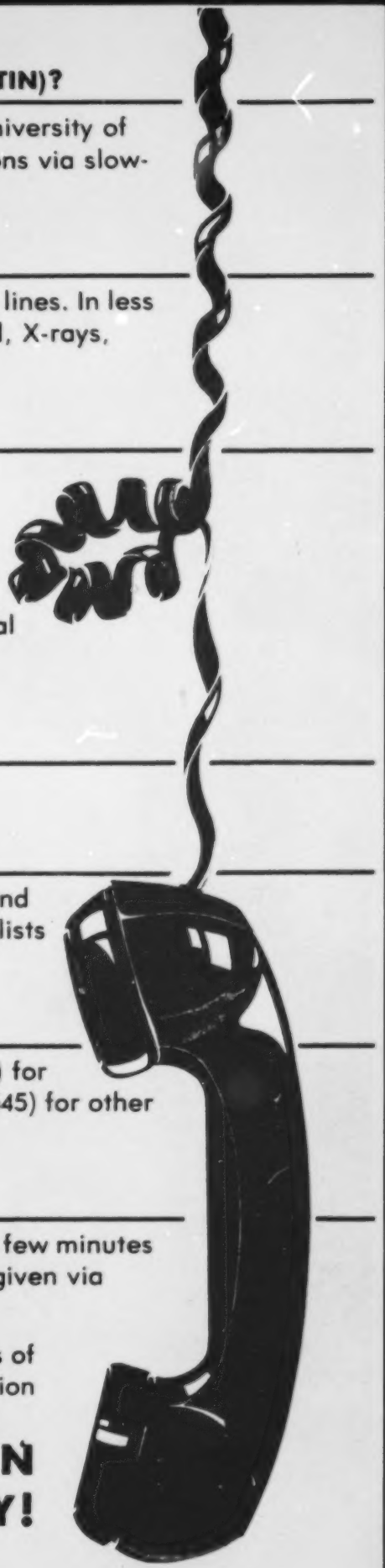
Telephone the Drug and Poison Information Center (872-5111) for drug-related questions or the Medical Center Libraries (872-5545) for other health-related questions.

What happens after I ask TIN a question?

Depending on the nature of the question, research may take a few minutes to a few hours. You are then contacted and the information given via telephone and/or slow-scan television.

You now have direct access to all of the information resources of the Medical Center Libraries and the Drug and Poison Information Center.

Remember: FAST INFORMATION IS ONLY A SLOW-SCAN AWAY!



A second type of collaboration was focused on the slow-scan technology used in this project. Since there were several other telecommunications projects using slow-scan, an attempt was made to create a national resource network composed of those slow-scan projects which provided, or had access to, health-related information. The attempt was unsuccessful for several reasons. Many of the projects had terminated or were no longer using their slow-scan equipment. Other networks were using slow-scan equipment incompatible with the Colorado Video equipment used on this project. At present a similar collaborative effort is being planned by the University of Cincinnati Drug and Poison Information Center. This proposed network would be based on a slow-scan link between several drug centers in Ohio.

C.4 REGULATORY/LEGAL IMPEDIMENTS

This project encountered no legal or regulatory impediments in the technologicl areas. However, the project staff is aware of similar slow-scan networks which were severely curtailed or delayed due to conflicts with Federal Communications Commission (FCC) regulations. The potential for legal friction is always present when experimenting with new technologies such as slow-scan television; these problems are likely to diminish as the technology becomes better established in the telecommunications marketplace.

C.5 STAFF TRAINING

Staff training in the use of the new technology did not present any especially difficult problems. The camera and slow-scan equipment proved extremely simple to operate. With the exception of needing a second person to hold the book or journal open before the freeze-frame capability was provided, transmitting could be accomplished easily by one person. The facilitators were given individual training in the equipment operation and each became adept at handling transmissions from the receiving end. In addition, written instructions for equipment use were provided at all equipment sites, including the Medical Center, and were updated as changes were made. Because the Medical Center Libraries' policies concerning interlibrary loans and computer searches remained identical for the Telecommunications Information Network, no procedural training sessions were needed.

C.6 GEOGRAPHIC IMPEDIMENTS

By nature of the grant proposal itself, the participating hospitals were located at varying distances from the U.C. Medical Center. The closest hospital was within 15 miles of the Medical Center and the most distant was 50 miles away. Unfortunately, the hospital where the most telephone difficulty occurred was also the one located the greatest distance from the library. This increased the amount of staff time and the cost expended in equipment maintenance.

A geographic problem did develop with the technological consultant to this project. The experimental status of slow-scan television and a very small market required this project to depend on a consultant located more than 250 miles from the project. This often created problems as the project staff did not have ready access to the consultant when technological problems occurred. The problem was never totally overcome, however, the project director learned enough about the technology to effect minor equipment repairs.

D. INSTITUTIONALIZATION

D.1 PLANS FOR INSTITUTIONALIZATION

Arrangements are being made for continuation of this project to the four site hospitals involved. The function of telecommunications has been incorporated into the Medical Center Libraries' division of Information Access. The Information Access division is responsible for the Libraries' other information services which include reference services, computerized bibliographic services, and educational services. The telecommunications function will therefore become an additional avenue through which the Information Access division is engaged in conveying information to library users.

During the tenure of the TIN grant project, the Medical Center Libraries' Information Access staff have provided back-up support of the project staff and all staff members are familiar with the operations and procedures of the slow-scan system. The Head of Information Access has become integrally involved in the telecommunications grant project as it has neared completion in order to facilitate the transition of responsibility from the project staff to the Information Access division.

The Medical Center Libraries has opted to continue telecommunication services to those site hospitals which are willing to support the project financially. Effective July 1, 1981 each of the four hospitals is being asked to pay an equal amount to cover such costs as technical support, maintenance, site visits, and telephone costs. Additionally, each hospital will be charged for the library's staff costs and the usage of online services. These two costs have been prorated based on the usage statistics of the TIN system by each hospital during the grant funded period. The telecommunications equipment will be removed from those site hospitals which are not interested in continuation of the telecommunications service after July 1, 1981.

The annual cost to those hospitals willing to continue the service will be negotiated on an annual basis. Usage statistics will continue to be kept by the Health Sciences Library. The annual fee charged to each hospital will remain the same through the year regardless of the number of questions.

The Drug and Poison Information Center is interested in continued use of the library's slow-scan equipment. The Drug and Poison Information Center will be asked to keep statistics only on those questions responded to using the library's slow-scan equipment. The library will continue to maintain the equipment and cover the telecommunications expenses incurred by DPIC in their use of the slow-scan equipment to any of the four site hospitals.

Equipment which becomes available in the event that one or more hospitals pull out of the project will be available for placement at other sites. Several area hospitals have expressed some interest in participating. There is also interest in placing some equipment within the Medical Center to enable transmission to patient-care areas such as the Emergency Room. Arrangements for placement of equipment made within the Medical Center or in other hospitals after July 1, 1981 will be accompanied by a means of partial or total cost recovery from the users of the slow-scan equipment.

D.2 BARRIERS TO FULL IMPLEMENTATION

There are several barriers to the Telecommunications Information Network becoming self-supporting. One of the main barriers is financial support. The hospital administrations must view the project's continuation as a high enough priority to justify its financial support. In many hospitals funding for library and for information services is not considered a high priority need and information services are not adequately funded. Information services and technological advances are not inexpensive and their benefits to a health-care institution are not always immediately visible or brought to the attention of the administration.

An additional aspect of financial support of telecommunications by the hospitals is that by asking the site hospitals to now support the TIN project they are supporting some services which they would otherwise obtain at no charge. The Medical Center Libraries' reference services are accessible to all hospitals in the Cincinnati area over the telephone or in person, regardless of whether the hospital is intimately involved with the Medical Center Libraries as through the TIN project. There is no charge for limited reference assistance to any library user. The same is true for DPIC services. Many of the requests directed to the Health Sciences Library and to the Drug and Poison Information Center by the four site hospitals during the project period would have been answered at no charge to the same hospitals prior to grant funding. Those services which will be made available to the hospitals through financial support, which would otherwise be unavailable to them, are access to the slow-scan network and in-depth reference assistance within a 24-hour response period.

A major disadvantage of the equipment used is the amount of time involved in transmission and the inability to transmit a full printed page. Only ½ to ¼ of an 8½ x 11-inch printed page can be transmitted at a time. An image does not appear on the video monitor instantaneously as it is transmitted. It takes 75 seconds per transmission for the full image to appear. The requestor of the information has to be present to read the materials transmitted as they appear on the hospital's monitor. When making a slow-scan transmission, a large amount of coordination of individuals in different places is involved. At the library the project librarian and oftentimes one other staff person are present for the transmission. At the hospital, the facilitator and the requestor of the information typically need to be present. Coordinating the availability of three or four persons per transmission is a very time-consuming task. In response to the majority of TIN requests to the Medical Center Libraries, the requestor preferred to

receive a complete photocopy of the journal article or book chapter of interest through the mail which could be read at his/her leisure rather than viewing a monitor under time constraints.

Each time a TIN request for information is generated and researched a decision must be made as to which materials to transmit via slow-scan and which to refer through interlibrary loan. A feeling seemed to evolve over time among the project staff involved in making these decisions that if an item were too long to be read or its contents communicated over the phone, it was also too long to be easily transmitted.

The slow-scan equipment was used in response to only 18.7% of the total questions generated during the project. The majority of TIN questions were responded to over the telephone, often with additional printed materials being sent to the hospitals through the interlibrary loan mechanism. There has been a declining use of the slow-scan equipment over the course of the project. This fact points to the reality that several telecommunications barriers existed which discouraged use of the system.

The lack of mechanical expertise among the Medical Center Libraries staff poses another barrier. This will necessitate the Libraries' hiring a consultant or technical specialist to assist in mechanical problems as they develop. (Mechanical problems are addressed elsewhere in this report and will not be discussed here.)

An additional barrier to the system's usage is the necessity of public relations efforts to encourage use of the system to educate potential users. Public relations efforts must be made by persons enthusiastic about the technology, preferably by those at the recipient end of the slow-scan network. If the hospital administration, the hospital librarian, physicians, public relations office, education staff and others are not encouraging use of the system, it is not likely to be used. Use of the system is difficult to initiate by individuals outside of the organization without substantial support from within.

During the grant period limited public relations efforts were made involving the site hospitals. More efforts by project staff would probably have made some impact on the usage of the system. Increased personal contacts between project staff and hospital staff, the potential users, would probably have increased the overall usage of the system. The real need or desire for the service must ultimately come from the user institution.

E. DISSEMINATION

E.1 REPLICATION OF SERVICES AND/OR TECHNOLOGY

Replication of Services - There are significant differences between the services which were outlined in the original proposal and those most commonly provided by TIN. The details of the evaluation of the network are discussed in greater detail elsewhere in this report; however, the basic difference lies in timeliness of the information provided. Originally the Telecommunications Information Network was conceived as an "on-demand" network which would be sensitive to the urgency of requested information. The experiences on this project indicate that "timeliness" rather than "immediacy" was needed. Although the information requested was almost never associated with a medical emergency, many requests required an answer within a day or two.

This service was invaluable to many TIN users as indicated by their comments. Despite the fact that an information network based on immediate responses to medical questions may not be an appropriate service to offer, health-care providers do need access to current information and will use a service that provides this information when it is needed. The major difference between the two types of networks is the definition of "on-demand." In the first network, "on-demand" means immediately and is associated with a life threatening situation. The establishment of this kind of service is not recommended because the need does not exist on a large enough scale to make a network practical. In the second network "on-demand" refers to the ability to provide information when it is needed. The information is likely to be related to a patient treatment approach and not require an immediate response. This type of service is reproducible in many environments using a variety of telecommunication technologies.

Replication of Technology - Slow-scan television was at the base of the original network proprosal. Technical problems plagued the design and development of the network throughout the project. In defense of slow-scan television, most of the problems were caused by poor quality telephone service or equipment interfacing slow-scan with phone lines. Slow-scan technology was, nevertheless, often viewed as a poorly conceived and ineffective technology because of its sporadic breakdowns and marginal image quality. Detailed comments on the deficiencies of the technology are discussed elsewhere in this report.

Slow-scan television is a very cost efficient technology for transmitting visual images. It is the experience of this project that hard copies of the transmitted information were more valuable to the network users than the visual image alone. This is not due to inherent deficiencies in the technology but rather because of the way the network functions. The network's heavy users, primarily physicians and pharmacists, channel questions through facilitators at each hospital. The facilitators make the requests to the TIN staff in the name of the information seeker. The responses are made through the facilitators and there is almost no direct contact between the TIN staff and the health professional requesting the information. The facilitators, on the other

hand, find it difficult to determine the adequacy of a TIN repsonse and would find it impractical to locate the original requestor or to leave the transmitted information on the video monitor. It has, therefore, become convenient to use slow-scan television only when the requestor is present or when hard copies can be made. The alternative to slow-scan has been a verbal response or photocopies of the appropriate material being mailed to the requestor or facilitator.

If a network has a need for direct contact between system users and resource individuals then slow-scan television is an appropriate telecommunications technology. It is not the only technology available for such purposes and may not be the best technology for every situation but it does have the advantage of being relatively inexpensive and easily adaptable to existing telephone transmission lines.

E.2 DISSEMINATION OF PROJECT RESULTS

The project staff has promoted the development and growth of telecommunications networks by widely publicizing the experiences with this project. The project staff has responded to numerous requests for information regarding this project. Presentations describing the project were given at professional meetings including: the Fourth International Congress on Medical Librarianship in Belgrade, Yugoslavia; the national meeting of the American Society for Information Science (ASIS); the national meeting of the Medical Library Association; and the Ohio Academy of Science. (For a complete list of presentations and publications see Appendix E.) Future plans for dissemination of information include professional publications and presentations in addition to making the project evaluation available to interested individuals.

Locally, several hospitals have expressed an interest in becoming part of the existing Telecommunications Information Network. Plans are currently being developed to find a means of funding the purchase of the necessary equipment to expand the network. The University of Cincinnati Drug and Poison Information Center is also working on the creation of a state-wide drug information network which would use slow-scan technology and a network model similar to TIN.

E.3 BARRIERS TO DISSEMINATION

Although the project has not experienced notable constraints to dissemination, the staff has become aware of two major problems in this area. First, most projects do not consider dissemination of project experiences an important part of a project proposal and consequently have not planned or budgeted for this activity. This makes presentations and publications coincidental rather than systematic. Secondly, telecommunications techology is generally considered a tool which can be applied to numerous environments and therefore dissemination is often limited to a single field.

The first problem might be overcome by requesting or requiring dissemination plans as part of a grant proposal. This might ultimately increase a projects budget; however, it would also insure a systematic approach to dissemination activities. The second problem is more substantial and requires a more complex solution. At present there is no single forum for the dissemination and exchange of information of telecommunication networks and technology. Even the federal government has several offices funding telecommunications projects. The centralization of information and the creation of a forum for information exchange would greatly facilitate dissemination and adoption of new technologies.

F. COSTING AND FINANCIAL INFORMATION

F.1 START-UP COSTS

The start-up costs for this project include all non-recurring costs: equipment ($63,215); recruitment ($2,105); training ($902); and other miscellaneous expenses ($2,500.) Total start-up costs were $68,722 and are itemized below.

Equipment

Item	Quantity	Unit Price	Total Cost
CVI Model 275 receiver	4	$ 7,500	$30,000
CVI Model 260B transmitter	1	$ 2,500	$ 2,500
CVI Model 280 transceiver	1	$10,000	$10,000
GBC Model PM-171T video monitor	8	$ 575	$ 4,600
GBC Model MV-12A video montitor	2	$ 315	$ 630
Dage Model 650 video camera	2	$ 750	$ 1,500
Elgin Model 1001D Data Access Arrangement	4	$ 400	$ 1,600
Tektronix Model 4632 Hard copy unit	2	$ 4,600	$ 9,200
Miscellaneous Wiring	1	$ 350	$ 350
Miscellaneous Office Equipment (i.e., desk, typewriter, dictating equipment)		$ 2,835	$ 2,835
Total			$63,215

Recruitment

Project Director

Search Committee Meetings	$720	
Travel and Accomodations	75	
Advertising	100	
Total	$895	

Project Librarian

Search Committee Meetings	$ 750	
Travel and Accomodations	250	
Advertising	100	
Total	$1100	

Project Assistant

Total	$110	
Total		$ 2,105

Training

Project Director (1 week)	$368	
Project Librarian (1 week)	311	
Project Assistant (1 week)	223	
Total	$902	$ 902

Other

Engineering; Design Consultant	$2500	$ 2,500

Total Start-Up Costs $68,722

F.2 OPERATIONAL COSTS

Operational costs for this project include all on-going costs pertaining to the delivery of services: equipment ($10,075/yr.); space/facilities ($8,760/yr.); staff ($60,876/yr.); and other miscellaneous expenses ($2,151). Total operating costs per year of this project are $81,862 and are itemized below. These costs include monies for service delivery and research and management of the demonstration project. A self-supporting operational network based on this project would have greatly reduced costs for research and management. This savings could be as much as $32,000/year, thus reducing annual operating costs to under $50,000.

Equipment

Operation		$ 9,075	
Phone Costs	$1,575/yr.		
Equipment Wear	$7,500/yr.		
Maintenance		1,000	
Total		$10,075/yr.	$10,075/yr.

Space/Facilities ($2 sq. ft./mo.)

Project Director's Office (120 sq.ft.)*		$2,880/yr.	
TIN Office (Project Librarian, Project Assistant, and Equipment) (150 sq.ft.)*		3,600/yr.	
DPIC Office Space (15 sq.ft.)*		360/yr.	
Hospital Space (80 sq.ft.)*		1,920/yr.	
Bethesda North (15 sq.ft.)*			
Brown County (25 sq.ft.)*			
Clermont County (15 sq.ft.)*			
Mercy North (25 sq.ft.)*			
Total	365 sq.ft.	$8,760/yr.	$ 8,760/yr.

Staff (Technical)

Project Assistant (Salary and Benefits)	$12,200/yr.	$12,200/yr.

Staff (Service Delivery)

Project Librarian+ (Salary and Benefits)	$18,738/yr.	
DPIC (Consulting)	5,000/yr.	
Total	$23,738/yr.	$23,738/yr.

+ 10% In-Kind Contribution
* In-Kind Contribution

Staff (Research and Management)

Project Director + (Salary and Benefits)	$21,105/yr	
Principal Investigator (5%)* (Salary and Benefits)	$ 1,825/yr	
Business Manager (5%)* (Salary and Benefits)	$ 985/yr	
Head, Information Access (5%)* (Salary and Benefits)	$ 1,023/yr	
Total	$24,938/yr	$24,938/yr.

Other

On-line bibliographic searching *	$ 120/yr	
Supplies	$ 1,200/yr	
Computer	$ 250/yr	
Travel	$ 581/yr	
Total	$ 2,151/yr	$ 2,151/yr.

+10% In-Kind Contribution
*In-Kind Contribution

F.3 COST SENSITIVITIES

There are several difficulties in calculating the cost effectiveness of a telecommunications information network such as this. Information is an entity that defies pricing since it is the use of the information that has a measurable effect on people and the environment. The ultimate use of the information and better health care also has measurement problems.

This project was funded as a demonstration, and as such, it had a heavy research component. It would be inappropriate to include the costs of this research in a determination of the costs per unit (request). A more realistic estimate of per unit costs is obtainable from network operational costs. (Operational costs = Macro costs - Research costs).

The costs for this research project includes the staff time and computer costs. The indirect costs (overhead) and the value of the equipment (based on a five-year life expectancy) have also been added since these would normally be considered "sunk costs." (Table F.3.1)

Table F.3.1

Non-Operational Network Costs

Personnel	
1.0 Kues	$36,094.50
.5 McGuire	16,381.12
.5 Ruben	9,444.96
.5 Stipends	55.20
	$61,975.78
Benefits @ 20.6%	$12,767.01
Computer	$ 400.00
Overhead	29,366.00
3 years remaining equipment life	37,755.00
	$142,263.79

From these figures the net cost of TIN operations for the 27 month project period is $63,285.21.

Project Funding Level	$205,549.00
Non-Operational Costs	142,263.79
Net Operating Costs	$ 63,285.21

This represents an annual rate of $28,126.76. It should be noted that these operating costs are significantly different from the project operating costs outlined in Section F.2. The project operating costs reflect on-going costs for this project, and while equipment costs are not included, research and project management inflate project operational costs to more than double that of net operating costs.

In analyzing the resources expended for a typical TIN request, Table F.3.2 illustrates the microcost per question to be quite low ($13.17). This figure assumes in-kind contributions of overhead, administration, hospital site phone lines, hospital facilitator time, and third party specialty consults. The microcost reflects only the cost of responding to a question and is not an indicator of the cost of operating a network. Costs for such things as supplies, planning, hospital site visits, public relations efforts, and equipment maintenance are not included in the microcost figures but represent real costs for network operation.

Table F.3.2

TIN Microcosts

Personnel (including benefits)

Research Time	45 min	$ 7.86
Transmission Time	8.5 min	1.48
Logging in, coding, running program	15 min	1.81
Total	68.5 min	$11.15

Non-Personnel

MEDLINE cost	$ .56
Phones $.30/hr.	.05
Postage	.30
Equipment $4.30/hr.	.61
Computer	.50
Total	$13.17

F.4 COST SHARING

The TIN system is highly susceptible to cost sharing, or a fee-for-service arrangement. Although the cost an institution would be charged for access to TIN would be significantly higher than competing systems such as the present interlibrary loan network, or MEDLINE, the Telecommunication Information Network has some unique advantages. The major assets of TIN are: 1) speed (response time can be as quick as one hour); 2) access to a wider range of resources (TIN staff can use print, non-print, and human resources to search a question); and 3) a trained staff (the TIN staff has specific training and vast experience in searching health sciences information resources. Plans for a cost sharing program have been planned and implementation has begun at the time of this report. Section D. STRATEGIES FOR INSTITUTIONALIZATION discusses this plan in detail.

F.5 COST VARIANCE AS AFFECTED BY SPECIFIC FACTORS

F.5.1 Number of Clients Served

Additional sites would be required to purchase their own equipment. This gives the hospitals a certain amount of latitude in determining the design and complexity of the system configuration at each site. Costs for equipment would range from $9,000 for a video expander, a video monitor, data access arrangement and wiring to $14,500 for a video expander, two video monitors, a hard-copy printer, data access arrangement and wiring. Since a cost sharing system determines costs for each institution based on a minimum flat rate plus a prorated charge determined by usage levels, the complexity of the technological network at a hospital will not directly affect cost sharing charges.

F.5.2 System Configuration

The present TIN system provides a one-way video transmission system, from the U.C. Medical Center to the site hospitals, with an interactive audio system via telephone. This system does not allow site hospitals to transmit visual information either to the Medical Center or to other hospitals. A totally interactive system might be advantageous if the network were to expand to include a form of telemedicine or telediagnosis. Such an expansion would require specialists at the U.C. Medical Center to "see" video scans of patients, x-rays, etc. from the remote hospitals. To do this, additional equipment would be necessary (including video compressors at $1,500 each and video cameras at $850 each.)

A change in the system configuration as described above creates several problems for the proposed cost sharing methodology: 1) use of the network will be difficult to monitor, especially between hospitals; 2) control of the system becomes decentralized and greatly reduces a justification for the TIN office charging for information research unless all hospitals develop similar cost-recovery methodologies; and 3) it greatly increases the complexity of a cost sharing calculus by opening the system to such uses as telediagnosis and teleconferencing. Useful system expansion is a desirable goal for the future of TIN and problems of cost sharing should not be seen as an obstacle. The costs of maintaining such a system, however, cannot be overlooked.

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Appendix A

EVOLUTION OF THE TIN SLOW-SCAN SYSTEM

The original proposal for the slow-scan network design was centered around a single video compressor at the Medical Center and a telephone coupler at each monitor site both at the site hospitals and the Medical Center (Figure 1). The design was found to be untenable for several reasons. This design had no provision for communication between monitor sites or transmission sites within institutions. In other words, a person wanting to use the system at one monitor site might unknowingly interrupt someone using the system at the other site within the same institution. Another problem with the original design was the lack of control over transmission and receiving equipment (the video compressor and expander) from secondary sites within institutions. Specifically, individuals at the Drug and Poison Information Center (DPIC) and second monitor sites at the rural hospitals cannot operate the video compressor or expander without help from someone at the primary locations. The same problem existed with the operation of the input selectors and hard copy units.

The solution to these problems resulted in many changes to the system design. Figure 2 illustrates the second generation system design. This was the design originally implemented for this project. There are several major changes from the original design. The first major change was to set up the TIN office and DPIC as independent transmission sites. This was necessary after an attempt to give DPIC remote control of the video compressor failed. An additional video compressor was purchased and an additional data access arrangement (1000A) was installed. It was also decided to provide each hospital with two video monitors. The initial operating system at each hospital, however, included only one monitor because of design difficulties. The major problem with this design was that only one telephone (and data coupler) could be attached to each video expander. This made it impossible to provide direct service to individuals at the secondary monitor site.

The proposal for YR 02 of this project included money to modify the slow-scan system in order to make second monitor sites practical (Figure 3). This included a telephone coupler (1001D) that connected incoming calls automatically. Remote control boxes were also constructed for both primary and secondary monitor sites within each hospital. The remote control boxes had switches to turn the slow-scan equipment on and off, indicator lights to show that the telephone connection is completed, and a timer to turn the hard copy printer on and off automaticaly. (Timers were located only at hospitals with printer.)

Each hospital was given the responsibility for laying the necessary cable to connect the secondary monitor site to the primary equipment site. At this point one hospital (Bethesda North) decided not to install a secondary site and a second hospital (Clermont County) decided to postpone installation because they wanted the second monitor in their new emergency facility which was still under construction. Both of these hospitals remained operational with one monitor site. Brown County, General, and Mercy North hospitals installed secondary monitor sites in the summer and fall of 1980. Figure 4 illustrates the final equipment configuration at each hospital.

In addition to the changes at the site hospitals, the video compressor at the TIN office (Medical Center Libraries) was replaced with a video transceiver. This new piece of equipment provided a "freeze-frame" capability allowing TIN staff to freeze an image in the transceiver's memory before it is transmitted. Previously, a "live" picture was transmitted which required the transmitted material to be held still for the 76 second transmission period. The "freeze frame" capacity also allowed TIN staff to prepare additional material to be transmitted while an image is being transmitted.

The transceiver is also capable of receiving slow-scan as well as transmitting. This feature was necessary for our efforts to link this project with others using slow-scan television. This project had minimal success in this area because of imcompatabilities between equipment used for various networks and because many projects had curtailed the use of slow-scan before linkages could be attempted.

Figure 1

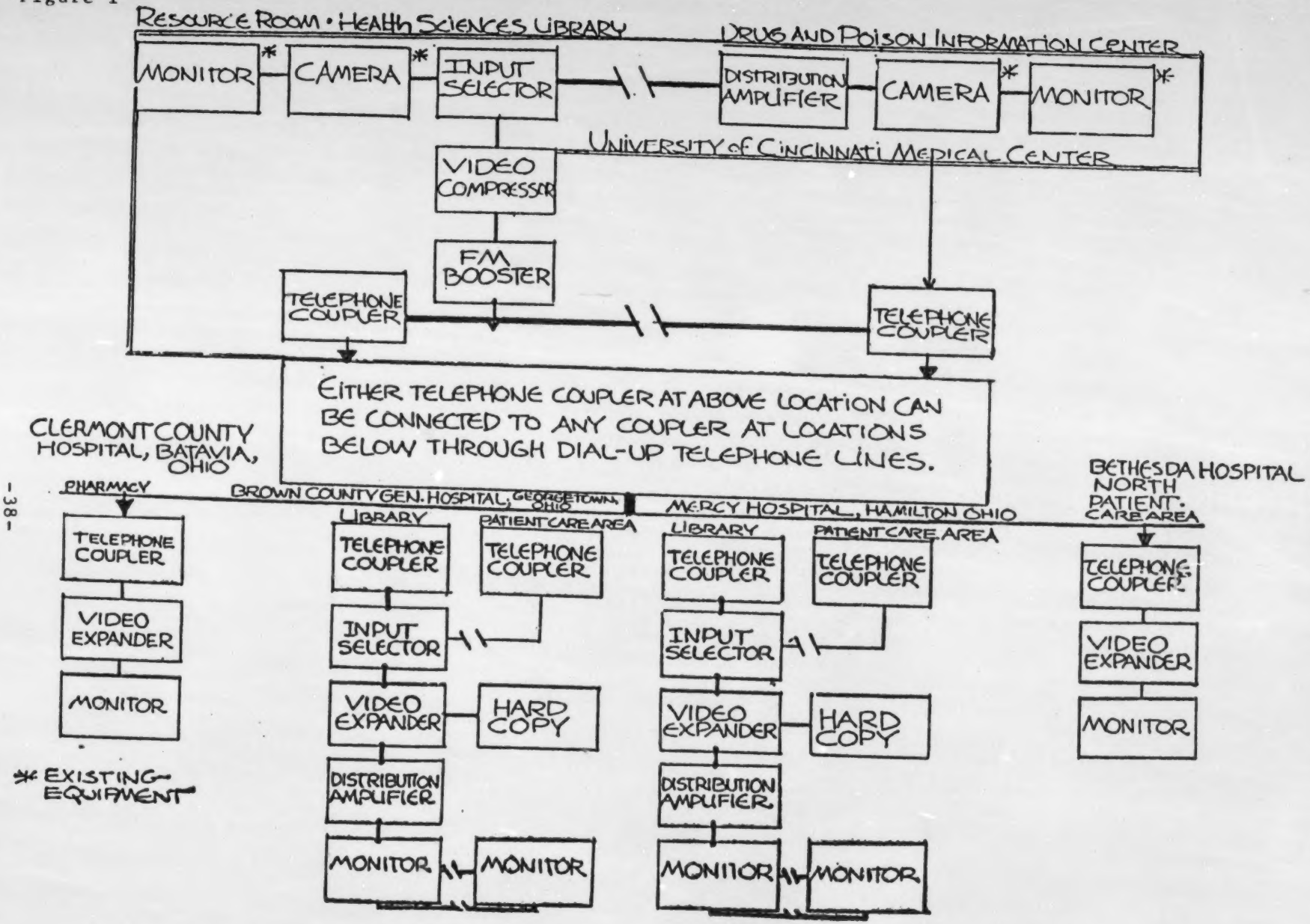

RESOURCE ROOM • HEALTH SCIENCES LIBRARY
DRUG AND POISON INFORMATION CENTER
MONITOR
CAMERA
INPUT SELECTOR
DISTRIBUTION AMPLIFIER
CAMERA
MONITOR
UNIVERSITY of CINCINNATI MEDICAL CENTER
VIDEO COMPRESSOR
FM BOOSTER
TELEPHONE COUPLER
TELEPHONE COUPLER
EITHER TELEPHONE COUPLER AT ABOVE LOCATION CAN BE CONNECTED TO ANY COUPLER AT LOCATIONS BELOW THROUGH DIAL-UP TELEPHONE LINES.
CLERMONT COUNTY HOSPITAL, BATAVIA, OHIO
PHARMACY
TELEPHONE COUPLER
VIDEO EXPANDER
MONITOR
BROWN COUNTY GEN. HOSPITAL, GEORGETOWN, OHIO
LIBRARY
TELEPHONE COUPLER
PATIENT CARE AREA
TELEPHONE COUPLER
INPUT SELECTOR
VIDEO EXPANDER
HARD COPY
DISTRIBUTION AMPLIFIER
MONITOR
MONITOR
MERCY HOSPITAL, HAMILTON OHIO
LIBRARY
TELEPHONE COUPLER
PATIENT CARE AREA
TELEPHONE COUPLER
INPUT SELECTOR
VIDEO EXPANDER
HARD COPY
DISTRIBUTION AMPLIFIER
MONITOR
MONITOR
BETHESDA HOSPITAL NORTH PATIENT CARE AREA
TELEPHONE COUPLER
VIDEO EXPANDER
MONITOR
* EXISTING EQUIPMENT

Figure 2

Telecommunications Information Network

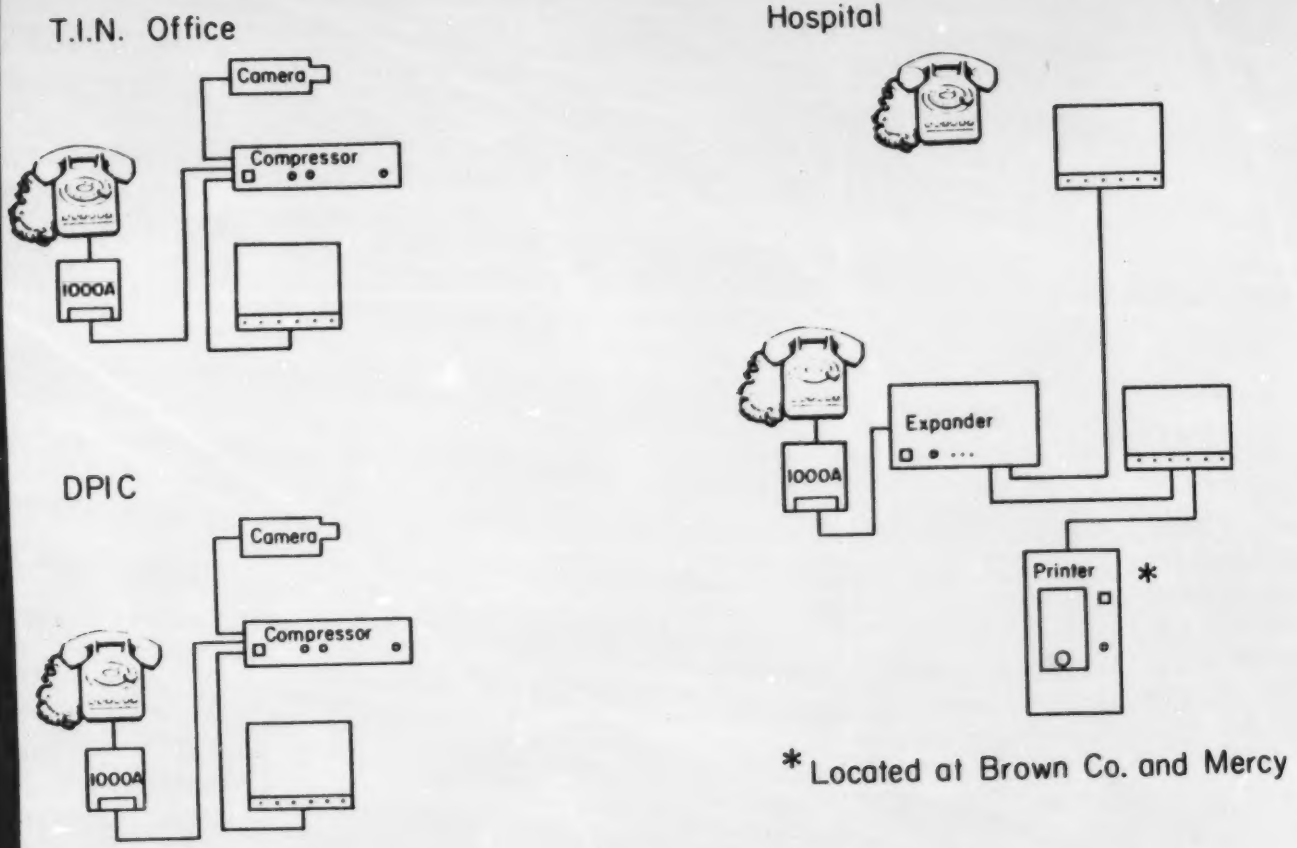


Figure 3

Telecommunications Information Network

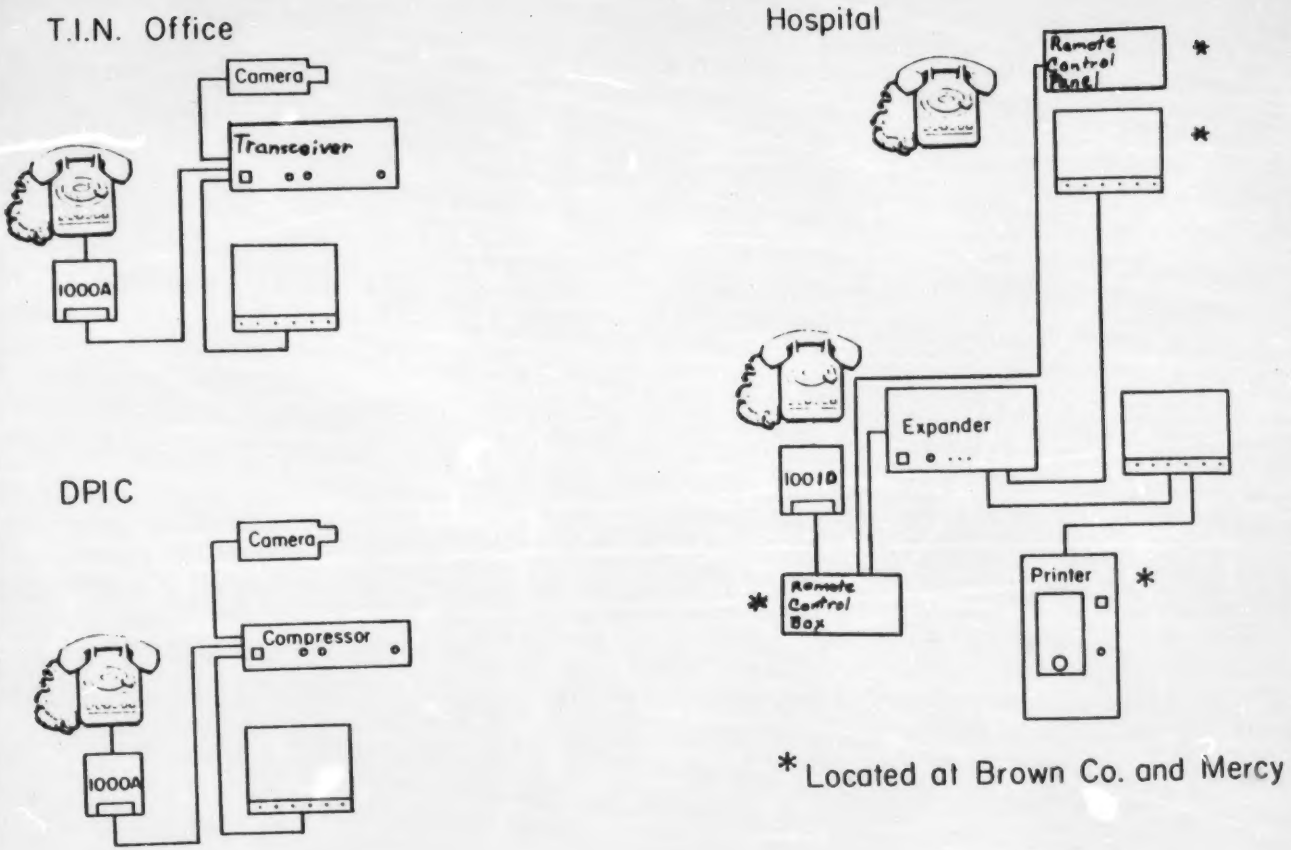
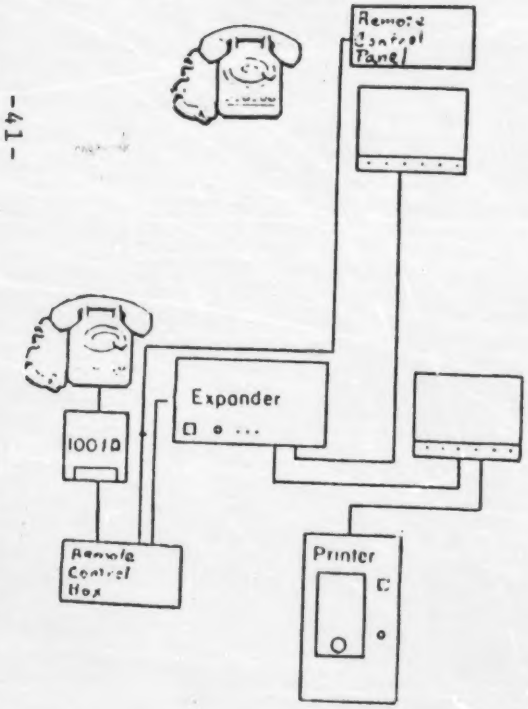


Figure 4

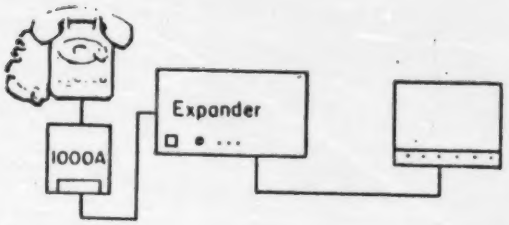
Telecommunications Information Network

Hospital Configuration

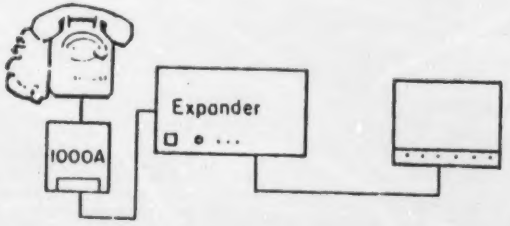
Mercy



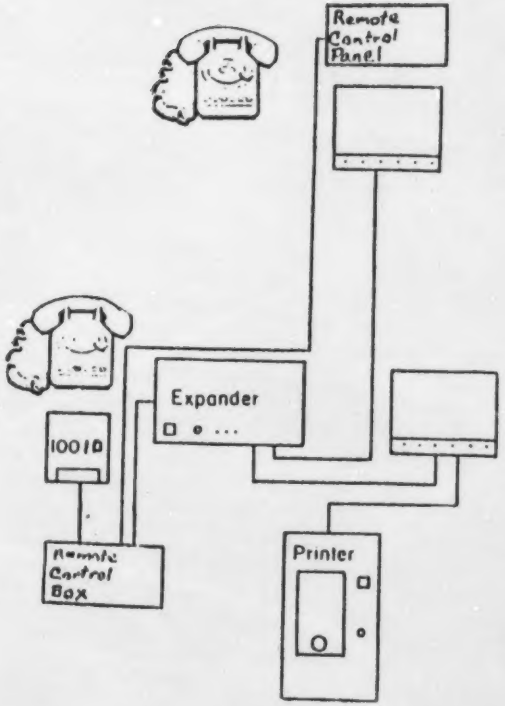
Bethesda North



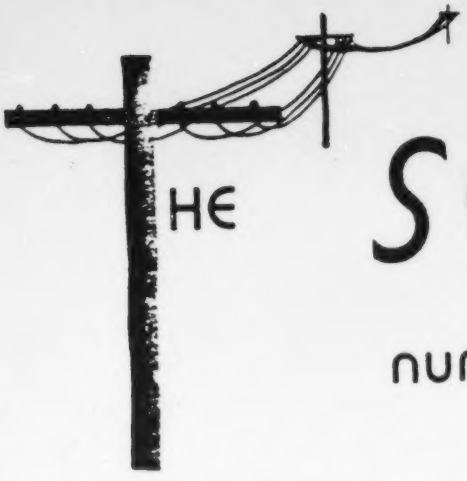
Clermont County



Brown County



Appendix B



THE SCANNER

number: 1 date: May 1, 1979

The telecommunications grant, which was recently awarded to the University of Cincinnati Medical Center Libraries by the Office of Telecommunications, Department of Health, Education, and Welfare, is getting under way! This project will establish a slow-scan telecommunications system as an alternate means of transferring on-demand medical information from a major medical center to health professionals in four remote settings. It will also evaluate the acceptability and usefulness of this system to the health care professionals utilizing it.

Because it is not economically feasible to provide major information resources and information searching services in each semi-rural and suburban hospital, the most realistic approach is to make the existing resources of a larger well-equipped facility available to the practitioners there. Slow-scan technology can provide a practical means of linking centralized resources and the health professionals in outlying areas.

The four receiving site hospitals selected for participation are: Brown County General Hospital, Clermont County Hospital, Bethesda North Hospital, and Mercy Hospital in Hamilton. There will be two slow-scan television monitors at each of the sites (except Bethesda North, which elected to begin with only one due to the centralized location of the hospital library).

Television cameras and staff will be located in the Telecommunications Information Network (TIN) Office of the Health Sciences Library and in the Drug and Poison Information Center (DPIC) at the University of Cincinnati Medical Center. They will respond to specific information needs when the "need to know" arises. Individuals at any of the four sites will be able to call the TIN Office or DPIC for answers to specific questions. The questions will be researched and, if a visual component is needed, the necessary information will be transmitted via slow-scan television to a monitor at the site hospital.

Slow-scan television is television in which the video signal is compressed

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A grant project funded by the Office of Telecommunications,
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872-5545

to a band-width suitable for transmission over voice-grade telephone lines. At the receiving end the signal is expanded and viewed over a television monitor. Slow-scan is an inexpensive and efficient alternative to live video, which would require extensive construction and equipment costs necessary to transmit the more conventional television signal. Any still image -- microfiche, slides, X-rays, book or journal pages -- may be reproduced; transmission time takes approximately 75 seconds. Two of the four site hospitals (Brown County General and Mercy Hospital) will also have the capacity to receive hard-copy prints of the information over the same television system.

A conference-calling line will also be available in the TIN Office, thus enabling consultation with specialists at the U.C. Medical Center. If the information resources of the library are unable to satisfactorily answer a question, then a three-way conversation may be initiated between the requestor, the librarian, and a specialist.

The system is scheduled to be operational by mid-May and if the project is successful, there is the potential for expansion in many directions.

* * * * * * * * * *

Each of the four receiving sites has selected a "facilitator" to help coordinate activities between the hospitals and the Medical Center and to help acquaint persons with the system. Facilitators and primary monitor locations will be:

Marcia Tomlin	Brown County General	Education Resource Center and HEALTH-U.C.
Michael Keeney	Clermont County Hospital	Pharmacy and Emergency Room
Thomas O'Conner	Bethesda North Hospital	North Medical Library
Frances McCullough	Mercy Hospital	Health Sciences Library

* * * * * * * * * *

Jack Kues has been appointed as the Director for the Telecommunications Information Network. Jack received his B.S. degree in Psychology and Sociology in 1975 from Northern Kentucky University, his M.A. degree in Sociology in 1977 from the University of Cincinnati, and is presently completing work for his Ph.D. from the Department of Sociology at U.C.

Melanie McGuire has assumed the position of Librarian for the TIN project. Melanie received her A.B. degree in Biology in 1975 from Earlham College, Richmond, Indiana, and her M.S.L.S. degree in June, 1978, from the University of Kentucky College of Library Science.

If there are any questions concerning the TIN, please contact the facilitator at your hospital or call Jack or Melanie at the U.C. Health Sciences Library, 872-5545.

THE SCANNER

number: 2 date: June 15, 1979

Telecommunications Information Network

The Telecommunications Information Network (TIN) is an experimental research project funded by the Department of Health, Education, and Welfare's Office of Telecommunications. TIN uses a slow-scan television to connect the Medical Center Libraries and the Drug and Poison Information Center to four outlying rural and semi-rural hospitals. The system is designed to provide on-demand information in response to specific medical questions from health-care providers at any of the sites affiliated with the project. The four Ohio hospitals involved with this project are: Mercy Hospital in Hamilton; Clermont County Hospital in Batavia; Bethesda North Hospital in Cincinnati; and Brown County General Hospital in Georgetown.

The primary focus of this grant is to research the utilization of TIN once it is in operation. Even though the technology for such a system has existed for several years, its potential applications are just beginning to be realized. The project is designed to study utilization rates and attitudes toward the use of the system. Comparisons will be made of different monitor locations within a hospital, different hospital sites, sites with and without hard-copy printers, and different types of usage by health-care professionals. Data will also be collected on the number of requests, the usage rates of slow-scan television and three-way conference calling, as well as the type of information requested. We hope that this research will give us insights into the "people side" of technology and will suggest some methods for improving exchange and dissemination of information in the health sciences.

Washington Conference

Jack Kues, Director of the Telecommunications Information Network, and Roger Verny, Head of the Media Resources Center at the Medical Center Libraries, recently attended a workshop on telecommunications in Washington D.C. Sponsored by HEW's Office of Telecommunications, the workshop was attended by others involved in federally-funded research projects as well as by Washington policy-makers who are interested in the future of telecommunications in the social service areas.

The workshop explored many different modes of telecommunications which are currently being tested. There was much interest and support for our TIN and it is very likely that we will be visited by representatives from HEW who want first-hand experience in seeing our system operate.

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Project Review Council

The Project Review Council is the coordinating body for the Telecommunications Information Network. The council will primarily be responsible for strategic planning regarding the project -- its direction and policy formation. Persons were chosen from the university and from each hospital site to represent different divisions of the research and health-care fields. They are:

Nancy Lorenzi	Medical Center Libraries, Moderator
Roger Parker	Drug and Poison Information Center
Ed Comer	HEALTH-U.C.
Marcia Tomlin	Brown County General Hospital
Bruce Erwine	Bethesda Hospital
Michael Keeney	Clermont County Hospital
Paula Dubeck	U.C. Department of Sociology
Branch Lotspeich	U.C. Department of Biomedical Communications
Roger Verny	Medical Center Libraries Media Resource Center

Representatives for Mercy Hospital and the Medical Center specialists involved in the three-way calling system are being arranged. The council has met twice in the last few months and has discussed policy priorities and evaluated some policy procedures. However, no policy will go into effect until adequate time has passed to study the initial system.

Slide/Tape Presentation

The TIN staff, with the help of MCL's Roger Verny, has produced a slide/tape presentation which describes and explains the system. This presentation, approximately thirteen minutes long, will be made available to anyone at the four site hospitals affiliated with the telecommunications grant. It will also be available in the Media Resources Center at the Health Sciences Library.

Hospital Profiles

During the next few months, background data about the staff at the four grant-affiliated hospitals will be collected. This data will be used to create a profile of the different staffs at each hospital. This profile, in turn, will help the research staff gain a better understanding of the informational needs and interests of the health-care providers at each site. Questionnaires attached to "The Scanner" will be distributed at each hospital; everyone's cooperation in returning them will be greatly appreciated and will facilitate our evaluation of the Telecommunications Information Network.

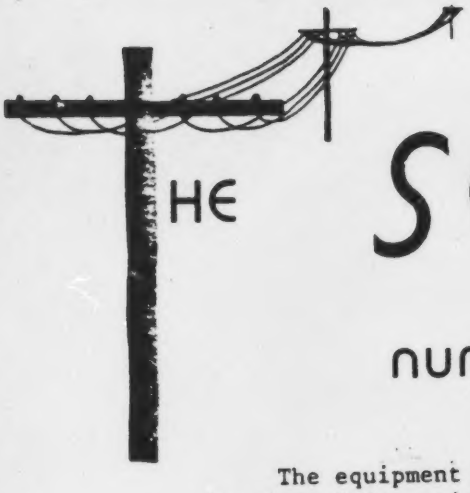
Equipment Installation

We regret that delivery delays and equipment problems have postponed the beginning of the grant. However, slow-scan equipment has been installed in at least one monitor location of each site and all hospitals except Clermont County Hospital are now connected with the Medical Center for transmission. As soon as their telephone coupler has been installed, the Clermont system will also become operable.

Bethesda North has decided to install a second monitor which will be located in the Emergency Department.

TIN Demonstrations

Members of the Telecommunications Information Network and Medical Center Libraries staff will be scheduling times for explanations and demonstrations of the system in the next several weeks. In the meantime, however, we encourage use of the network. If there are any questions or suggestions concerning the TIN, please contact the facilitator at your hospital or call Jack Kues or Melanie McGuire at the U.C. Health Sciences Library, 872-5545.



THE SCANNER

number: 3 date: August 27, 1979

The equipment at the four Ohio hospitals involved with the Telecommunications Information Network -- Mercy Hospital in Hamilton; Clermont County Hospital in Batavia; Bethesda North Hospital in Cincinnati; and Brown County General Hospital in Georgetown -- are fully operational. Questions from each of these hospital sites have been handled by both the Medical Center Libraries and the Drug and Poison Information Center. Explanations and demonstrations of the network have been given by members of the TIN and MCL staff at different site locations during the past weeks and will continue through the coming months. In the meantime, we encourage use of the system.

If there are any questions or suggestions concerning the TIN, please contact the facilitator at your hospital, call Jack Kues or Melanie McGuire at the U.C. Health Sciences Library, 872-5545, or call Leonard Sigell or Roger Parker at the Drug and Poison Information Center, 872-5111.

Drug and Poison Information Center

For those of you who are not familiar with the Drug and Poison Information Center, we would like to acquaint you with its many resources:

THE STAFF: DPIC is staffed by pharmacologists, pharmacists, pediatricians, nurses, hospital pharmacy technologists, among others. Additional assistance is available, when needed, from the Center's many consultants. These staff members are available to assist in searching the literature about drug-related problems and in the interpretation of available information.

REFERENCE MATERIALS: DPIC maintains a specialized library of books and periodicals dealing with drug therapy, pharmacology, medicine, toxicology, chemistry, etc. DPIC also maintains special files of data and articles on a variety of drugs, classes of drugs, problems associated with pharmacology, etc.

POISINDEX: Considered by many the premier toxicology information resource, this microfilm system is a useful reference for many purposes; e.g. determining the ingredients of various products, drug identifications (by product code), plant toxicity, etc. Poisindex also gives management protocols for various classes of intoxicants. The referenced management protocols are reviewed by recognized authorities throughout the country. Material for Poisindex is updated quarterly.

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DE HAEN DRUGS IN USE: This is a current literature reference system abstracting clinical trials and experiences from over 600 domestic and international biomedical journals. The abstracts describe the purpose of the study or report, the patient/s, doses and routes, duration of exposure, results and author's conclusions. This system is updated monthly.

DRUGDEX: Drugdex is DPIC's most recent acquisition. This is a microfilm service which consists of two parts: (a) drug evaluations which review the actions, uses, adverse reactions, kinetics, fetal and maternal effects, monitoring parameters, routes of administration, interactions, etc. of various drugs; and (b) drug consults giving detailed and referenced answers to specific therapeutic questions. These questions have been posed to drug information centers across the country.

THERAPEUTIC CENTERS: Now in its eleventh year, this publication of the Departments of Medicine and Pharmacology (produced by the DPIC) offers articles written by faculty of the U.C. Medical Center. Topics of recent issues include: "Update on New Antibiotics," "Pollutants and Health," "Drug Abuse: A Current Perspective," "Rational Choice of Oral Analgesics," "Disorders of Sleep: Diagnosis and Treatment," and "Current Management of Rheumatoid Arthritis."

Slow-scan will provide visual access to all of the services and resources of DPIC between 8 AM and 9 PM weekdays. Of course, telephone access to the DPIC for drug and toxicology information is still available 24 hours a day by calling the same (513) 872-5111 number.

Here are examples of the 8,000 questions posed to DPIC each year by health professionals in the area:

-- Is there evidence that doxepin produces less cardiotoxicity or less lowering of seizure threshold than other tricyclic antidepressants?
-- Other than ammonium chloride and furosemide, what can be done in managing life-threatening PCP overdoses?
-- How solid is the evidence implicating reserpine as a cause of breast cancer?
-- What constitutes current therapy for ciguatera poisoning?
-- Does cholestyramine bind methyldopa and/or imipramine?
-- Are dose adjustments of fluphenazine (Proloxin) needed for patients in renal failure?

Hospital Profiles

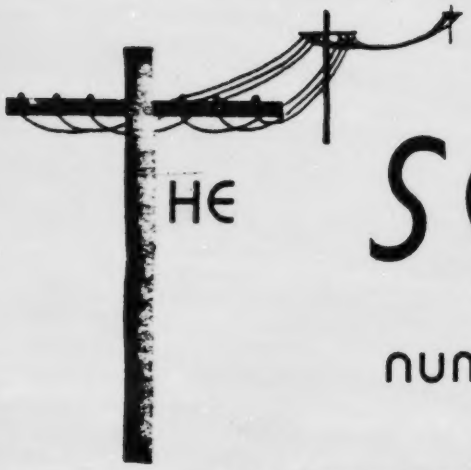
We are continuing to collect background data about the staff at the four grant-affiliated hospitals. This data is needed to create a profile of the different staffs at each location. The profiles will enable the TIN research staff to gain a better understanding of the informational needs and interests of these health-care providers. The questionnaires were attached to the last "Scanner;" we would appreciate everyone's cooperation in returning them to facilitate our evaluation of the TIN.

Facilitator Change

Ruth Huffman has replaced Marsha Tomlin as facilitator at Brown County General Hospital and Mary Espelage has replaced Michael Keeney at Clermont County Hospital. Mary has also taken Mike's place on the Project Review Council.

Equipment Installation

A second compressor was recently installed in the Drug and Poison Information Center. This will enable us to transmit from DPIC and MCL simultaneously rather than relying alternately on a single compressor unit.



THE SCANNER

number: 4 date: January 21, 1980

The Telecommunications Information Network (TIN) is an experimental research project funded by the Department of Health, Education, and Welfare's Office of Telecommunications. TIN uses a slow-scan television system to connect the University of Cincinnati Medical Center Libraries and the Drug and Poison Information Center to four outlying rural and semi-rural hospitals. The network is designed to provide on-demand information in response to specific medical questions from health-care providers at any of the sites affiliated with the project. The four Ohio hospitals participating in the project are: Mercy Hospital in Hamilton; Clermont County Hospital in Batavia; Bethesda North Hospital in Cincinnati; and Brown County General Hospital in Georgetown.

Questions continue to be received from the four site hospitals connected with the network. Here are examples of the type of information provided by the TIN Office in Year 01 of the grant.

Information on

- current usage of insulin infusion pumps
- effects of jogging or running on arthritis of the knee
- peumonia vaccines
- incidence of premature ventricular contractions by age, group, and sex
- number of post-operative pulmonary complications following any type of surgery
- accredidation standards for allowing animals in hospital operating rooms
- treatment of post-laminectomy with epidural injections
- trabeculectomy for glaucoma
- prognosis and treatment for Gilles de la Tourette's disease
- criteria for release of any patient from intensive care units
- use of beclomethasone dipropionate in treatment of nasal polyps and allergic rhinitis
- the effect of frontal lobe trauma on behavioral patterns
- management of chronic pneumothorax
- role of the pharmacist in CPR
- current recommended procedure for gallbladder X-rays, especially the use of "fatty meals"
- guidelines for isolation procedures for patients with viral hepatitis
- cost-effectiveness of the surgical laser
- use of radiant heaters in newborn nursuries

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Secondary Equipment Installation

We regret that delivery delays of new data coupler units and problems with necessary telephone linkage have postponed the installation of secondary monitors at the four hospital sites. Extra monitors are currently intended for the Emergency Departments of Bethesda North, Brown County General Hospital, Clermont County Hospital and for the Pharmacy at Mercy Hospital.

Extension of Year 01 for TIN

HEW funding for Year 01 of the Telecommunications Information Network was scheduled to terminate on December 15, 1979. However, because the project did not begin until mid-February of 1979, we were granted an extension of federal funding until February 15, 1980.

Second Year Proposal for TIN

Federal funding for TIN is granted for one-year periods. The proposal for our second year funding of this project was submitted to the Department of Health, Education, and Welfare in November and verification of funding continuation has been unofficially received. The government project will now end February 15, 1981.

For Year 02 we have proposed to continue all of the services TIN is currently providing. We also intend to expand the network in several new directions: The second year proposal requests new equipment to be placed in the TIN Office at the Health Sciences Library. This equipment will allow the four site hospitals to access an even wider range of resources than presently offered by the U.C. Medical Center. Included in these new resources are the Lister Hill Center (part of the National Library of Medicine); several research library facilities of Telenet (a slow-scan network centered at the Boulder Laboratories in Colorado); and Medical Care Development, Inc. (a slow-scan system serving health-care providers in Aroostook County, Maine). TIN will essentially become part of a much larger network that will greatly expand the informational resources available to our current users.

The second direction of expansion of TIN is in the area of educational materials. In cooperation with the College of Nursing and Health at the University of Cincinnati, we will be exploring the development of taped educational programs. These programs will provide an audio narration over one telephone line and visual illustrations via slow-scan over another. In addition to the nursing education programs, others will be developed for physicians, pharmacists, and other groups of health-care providers. These educational programs will be developed from existing ones at the Media Resources Center of the Medical Center Libraries.

* * * *

We are looking forward to providing our hospital patrons with the variety of new services we will be developing. We wish to thank everyone for their enthusiasm and support of this project and hope that it will continue in the coming year.

* * * *

If there are any questions or suggestions concerning the TIN, please contact the facilitator at your hospital, call Jack Kues or Melanie McGuire at the U.C. Health Sciences Library, 872-5545, or call Leonard Sigell or Roger Parker at the Drug and Poison Information Center, 872-5111.

THE SCANNER

number: 5 date: April 21, 1980

The Telecommunications Information Network (TIN) is an experimental research project funded by the Department of Health, Education, and Welfare's Office of Telecommunications. TIN uses a slow-scan television system to connect the University of Cincinnati Medical Center Libraries and the Drug and Poison Information Center to four outlying rural and semi-rural hospitals. The network is designed to provide on-demand information in response to specific medical questions from health-care providers at any of the sites affiliated with the project. The four Ohio hospitals participating in the project are: Mercy Hospital in Hamilton; Clermont County Hospital in Batavia; Bethesda Hospital North in Cincinnati; and Brown County General Hospital in Georgetown.

TIN Requests

Questions continue to be received from the hospitals connected with the project. Examples of requests received in the past several months are:

- information on elemental diets and obseity
- guidelines on infection control in the morgue
- information on general requirements of laminar flow hoods
- treatment for intractable hiccoughs
- information on diagnosis and treatment of diskitis
- the normal for the HDL/LDL laboratory test
- information on the use of propylthiouracil in the treatment of hyperthyroidism in pregnancy

Through February, Brown County General Hospital has been the biggest proportional user of TIN with 13.5 requests per 100 hospital personnel. Clermont County Hospital has the second highest user ratio with 10.2 requests per 100 personnel. Mercy Hospital has made 74 requests for information in the past six months -- more than any other hospital -- and Bethesda North follows with 70 TIN requests.

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Secondary Monitor Sites

New data coupler units will be installed at the four hospital sites to initiate linkage between the primary and secondary monitor locations. Audio cable connecting the expander with auxiliary monitors at each location is currently being installed; the second monitor at each hospital should be operational by June 1. The extra monitors are intended for the Ambulatory Care Unit at Brown County General Hospital; the Emergency Rooms at Bethesda North and Clermont County Hospitals; and the Pharmacy at Mercy Hospital.

Information Dissemination

The Telecommunications Information Network is primarily a research project designed to evaluate slow-scan technology as a means of transferring medical information from a major medical center to health professionals in non-medical center areas. Quantitative and qualitative data are being collected that will indicate the receptivity and feasibility of information transferred through telecommunications.

As well as the required federal reports for the research grant, the TIN staff is involved in providing results of the study to other persons and groups interested in improving the exchange and dissemination of information in the health sciences. On April 19, Melanie McGuire, Project Librarian, presented a paper to the Ohio Academy of Science Annual Meeting and will make a second presentation at the Medical Library Association Annual Meeting in Washington, D.C. in June. In September, Nancy Lorenzi, Principal Investigator, and Jack Kues, Project Director, will present a paper to the Fourth International Congress on Medical Librarianship in Belgrade, Yugoslavia.

Slow-Scan Video Transceiver

The compressor in the TIN Office of the Health Sciences Library has been replaced by a slow-scan video transceiver which gives the system receiving as well as sending capabilities at the Medical Center. This allows TIN to interact with other existing networks, providing access to a greatly increased amount of resources. The new transceiver also has freeze-frame capabilities that allow it to "freeze" motion. This capability will improve picture quality, shorten transmitting preparation time, and also is an important element in the production of educational programs with slow-scan technology.

Annual Report

The annual report for Year 01 of the Telecommunications Information Network has been submitted to the Department of Health, Education, and Welfare. Anyone interested in reading the report may obtain a copy from the facilitators at the site hospitals.

* * * *

If there are any questions or suggestions concerning TIN, please contact the facilitator at your hospital, call Jack Kues or Melanie McGuire at the U.C. Health Sciences Library, 872-5545, or call Leonard Sigell or Roger Parker at the U.C. Drug and Poison Information Center, 872-5111.

THE SCANNER

number: 6 date: August 1, 1980

The Telecommunications Information Network (TIN) is an experimental research project funded by the Department of Health, Education, and Welfare's Office of Telecommunications. TIN uses a slow-scan television system to connect the University of Cincinnati Medical Center Libraries and the Drug and Poison Information Center to four outlying rural and semi-rural hospitals. The network is designed to provide on-demand information in response to specific medical questions from health-care providers at any of the sites affiliated with the project. The four Ohio hospitals participating in the project are: Mercy Hospital in Hamilton; Clermont County Hospital in Batavia; Bethesda Hospital North in Cincinnati; and Brown County General Hospital in Georgetown.

* * * *

Large medical libraries too often present an austere, depersonalized facade. Although one knows that they are staffed with persons able and willing to help you, one sometimes feels far removed from this humanized aspect. And in the case of TIN, potential patrons are also physically removed from the Medical Center Library. And so we would like to acquaint you with the library and some of the reference tools at your disposal.

The Medical Center Libraries system consists of four service units which are backed by administrative and supportive services. These units, - the Health Sciences Library, the Nursing and Health Library, the History of Health Sciences Library, and the Media Resources Center - serve the information needs of both the Medical Center and the Greater Cincinnati community of health professionals. The library houses a monograph collection of over 125,000 and owns more than 2000 journal titles.

A large collection of reference materials is available in the Health Sciences Library, including many indexing and abstracting tools. Two of the major sources of medical information are Index Medicus and Hospital Literature Index.

Index Medicus is the National Library of Medicine's monthly bibliography of the literature of bio-medicine. The cumulated contents of the twelve monthly issues comprise the annual Cumulated Index Medicus. Index Medicus contains citations to the serial journal literature and to selected monographs. Original journal articles are indexed as well as those letters, editorials, biographies, and obituaries that have substantive content. Abstracts are never indexed.

Published by the Medical Center Libraries, University of Cincinnati, 231 Bethesda, 45267
A grant project funded by the Office of Telecommunications,
Department of Health, Education, and Welfare
872-5545

Monographs which have been indexed include published proceedings of various congresses and symposia, and selected multi-authored works.

Materials selected for inclusion are indexed by highly trained literature analysts. The content of each piece is described by assigning terms selected from Medical Subject Headings (MeSH), the Library's controlled vocabulary of technical terms.

Each article or monograph chapter cited in Index Medicus is printed under one or more subject headings and the entry appears in full under each.

References also appear in the Author Section of Index Medicus citing all author's names. Complete citations are printed only under the first author's name; all other author's names are cross-referenced to the full reference under the senior author's name.

Citations to medical reviews - well-documented surveys of the recent biomedical literature - are included in the "Medical Reviews" section of the monthly Index Medicus and Cumulated Index Medicus as well as in the Subject Section of each.

Hospital Literature Index, published by the American Hospital Association, is issued quarterly, with the last quarterly integrated into an annual hard-bound cumulation. Citations cover the delivery of health care in many different types of facilities and include all administrative aspects of it. Like Index Medicus, the Hospital Literature Index includes Author and Subject Sections, with articles indexed under MeSH.

Other reference materials include the American Medical Directory, the Directory of Medical Specialists, Current Contents, Science Citation Index, the American Statistical Index, Vital Statistics, Biological Abstracts, Chemical Abstracts, and International Nursing Index.

If you have a question or need information, remember that through TIN you have access to any of these library resources.

Secondary Monitor Installation at Mercy Hospital

Mercy Hospital's second monitor has been installed in the Pharmacy located in the main building. Installation entailed running approximately 600 feet of audio cable between the two locations, an accomplishemnt for which we thank the Mercy Hospital electricians. This auxiliary site can now have information transmitted directly to the equipment there; however, any hard-copy must be generated from the printer at the library. Instrucitons for using the equipment are posted at the Pharmacy monitor.

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If there are any questions or suggestions concerning TIN, please contact the facilitator at your hospital, call Jack Kues or Melanie McGuire at the U.C. Health Sciences Library, 872-5545, or call Leonard Sigell or Roger Parker at the U.C. Drug and Poison Information Center, 872-5111.

THE SCANNER

number: 7 date: February 20, 1981

The Telecommunications Information Network (TIN) is an experimental research project funded by the Department of Health, Education, and Welfare's Office of Telecommunications. TIN uses a slow-scan television system to connect the University of Cincinnati Medical Center Libraries and the Drug and Poison Information Center to four outlying rural and semi-rural hospitals. The network is designed to provide on-demand information in response to specific medical questions from health-care providers at any of the sites affiliated with the project. The four Ohio hospitals participating in the project are: Mercy Hospital in Hamilton; Clermont County Hospital in Batavia; Bethesda Hospital North in Cincinnati; and Brown County General Hospital in Georgetown.

Grant Support Ending

Federal grant support for the Telecommunications Information Network will be ending on March 15, 1981. However, from the evaluations and comments of TIN users, the Medical Center Libraries has concluded that this network is providing a needed service and we are committed to developing means for continuing it. Therefore the Medical Center Libraries intends to maintain TIN's present services for as long as it is feasible. In March, the network will become a part of the Division of Information Access with Susan Anthony as Head.

In a world of constantly growing and changing knowledge, it is increasingly difficult for health-care professionals to keep abreast of the latest developments. New information must be made readily available to them and new means of providing that information must be explored. The Telecommunications Information Network is the first project ever to use slow-scan technology to link hospitals to a major medical center and its information resources. It has demonstrated both the advantages and also the shortcomings of the existing technology. The network has helped to provide insights into information-seeking behavior of isolated health professionals and the necessary characteristics of the information networks that must satisfy those needs. It is from projects such as TIN that these networks can be developed and refined so that future networks may better meet the needs of their users.

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Appendix C

Script: Telecommunications Slide/Tape

In his bestselling book, Future Shock, Alvin Toffler states that, " . . . the number of scientific journals and articles is doubling . . . about every fifteen years." The number of books published in the field of medicine leaped from 520 titles in 1969 to 2,281 in 1974, an increase of over 300%. The number of journals published in the Life Sciences and Physical Sciences increased 25% from 1969 to 1974. According to Philip Siekevitz, a noted microbiologist, "What has been learned in the last three decades about the nature of living beings dwarfs in extent of knowledge any comparable period of scientific discovery in the history of mankind."

With this explosion of new information bombarding health professionals it is impossible for them to keep up with the latest developments in their fields. This is accentuated in rural areas where often much of a health professional's time is devoted to the actual providing of patient care. In general, rural hospitals attract fewer specialists and more time is spent on actual patient care which leaves less time for research and training. It is important, however, that these health professionals have access to the latest medical information in order to maintain a high standard of patient care.

With the rapid growth of medical technology it is becoming increasingly apparent that a team approach to patient care is necessary. No longer is it feasible for a single practicing physician to provide total care for his patients. Even for a minor operation a patient may see three or four different physicians, a half dozen nurses, several therapists and technicians and countless other service workers. Each is a specialist in his or her own field and provides a very specific service in the total care of the patient. Having access to the latest medical information is also a vital part of the patient care process. The specialist in this area are medical information specialists who are trained in the organization and retrieval of medical information. In recent years these information specialist are being recognized as an important part of the health care team. By searching out and providing other health professionals with relevant information patient care can become more effective and new medical advances can reach the practitioners more quickly. Programs such as LATCH (Literature ATtached To CHarts) in which the medical librarian attaches relevant literature to the patient's chart represents the efforts medical librarians have made to become more active in patient care. In an age of information explosion the Medical Center Libraries at the University of Cincinnati are investigating innovative methods for making information available when and where the health professional has a demand for it. This ready access to information enables a health professionals to make decisions based on the most current information available.

The University of Cincinnati Medical Center is a regional health care center for Southwest Ohio and parts of Kentucky and Indiana. It has a faculty of 900 and is one of the leading centers for medical research in the United States. To support the research and education being done, the Medical Center Libraries has an extensive collection of books, journals and non-print material. The Telecommunications Information Network System is designed to provide rural health professionals access to this storehouse of resources at the Medical Center.

The Telecommunications Information Network is an experimental research project funded by the Department of Health, Education and Welfare's Office of Telecommunications. The Telecommunications Information Network System uses

a slow-scan television to connect the Medical Center Libraries and the Drug and Poison Information Center to four outlying rural and semi-rual hospitals. The hospitals involved with this project are: Mercy Hospital in Hamilton, Ohio; Clermont County Hospital in Batavia, Ohio; Bethesda North Hospital in Cincinnati, Ohio; and Brown County General Hospital in Georgetown, Ohio. Also served by the Telecommunications Information Network System is the Health Education Alliance through the University of Cincinnati (HEALTH-U.C.). HEALTH-U.C. is an Area Health Education Center for the eight county area of Southwest Ohio whose goals are to attract health professionals to underserved areas. All four site hospitals are located in HEALTH-U.C.'s area.

The Telecommunications Information Network is designed to provide on-demand information in response to specific questions from health care providers at any of the sites affiliated with the project. Providers can phone in their questions to either the Telecommunications Office of the Medical Center Libraries or to the Drug and Poison Information Center also located at the University of Cincinnati Medical Center. The specialists in these areas will then research the question and supply the most appropriate information relevant to the request. The Telecommunications Information Network System maintains one way video via slow-scan and two way audio via telephone beteen the Medical Center and the hospital sites. The slow-scan television which we see in our homes, can only transmit still objects. Slow-scan was chosen over real-time as a medium for several reasons. First, the real-time transmission of information would require a more expensive system to construct and operate. In order to transmit a real-time television signal to all but the closest site hospital a powerful transmitter or microwave links would have to be constructed, the costs of which would be prohibitive. Slow-scan television uses existing voice-grade telephone lines which are presently the most extensive telecommunications system in the world. This extends the potential range of a slow-scan network to any place a phone line exists. The use of existing phone lines to transmit the slow-scan signal drops the cost considerably. The second reason slow-scan was chosen over real-time television is based on the type of information which is being transmitted. Since the Telecommunications Information Network System is designed to transmit information which is generally printed and immobile there is no need to be able to transmit movement. Therefore, the slow-scan system provides many of the capabilities necessary in a cost effective manner.

The slow-scan network consists of two video cameras located in the Telecommunications Office at the Medical Center Libraries and the Drug and Poison Information Center. These two cameras send a video signal into a video compressor located in the Medical Center Libraries. The video compressor then changes the live video signal to a voice-grade slow-scan signal. The video compressor is connected to a standard phone line by a special data coupler. The connection is made by dialing the number of a phone with a similar data coupler adapter at the site hospitals. Each of the four hospital sites are equipped with a video expander which receives the slow-scan signal and displays it on a monitor. Each hospital is equipped with two video monitors located at different sites within the hospitals. The Area Health Education Center (HEALTH-U.C.) located at Brown County General Hospital also has one of the monitors in its offices. It takes 76 seconds to complete a single transmission after which the picture can be held in the memory of the video expander as long as the video expander is left on. In addition to the monitors two of the hospitals (Brown County General and Mercy) have hard copy video printers which will allow these sites to make photostatic copies of the pictures on the monitors.

The Telecommunications Information Network is activated when a health care provider at one of the sites has a medical question. He telephones the Drug and Poison Information Center for drug-related questions and the Telecommunications Information Network Office for any other medical questions. The information specialists at these locations then research the question using all available resources. If the question can be answered orally then the response is given over the telephone. If a visual image can more effectively answer the question, then the slow-scan television system is used. If additional consultaion is needed then a three-way conference calling system can be used which allows a medical specialist to participate in the conversation.

The primary focus of this grant is to research the utilization of the Telecommunications Information Network System once it is in operation. Even though the technology for such a system has existed for many years, its potential applications are just beginning to be realized. The project is designed to study utilization rates and attitudes toward the use of the system. Comparisons will be made of different monitor locations within a hospital, different hospital sites, sites with and without hard copy video printers and different health professionals. Data will also be collected on the number of requests, the usage rates of slow-scan television and three-way conference calling as well as the type of information requested. This research will give us insights into the "people-side" of technology and will hopefully suggest some methods for improving exchange and dissemination of information of the health sciences.

The Telecommunications Information Network and related technologies have potential far beyond their present use. For example, it was discovered while setting up the Telecommunications Information Network System that the slow-scan signal could be recorded on to a standard cassette tape. This recording ability allows us to store frequently transmitted items which saves the time it takes to retrieve the information and set-up and adjust the camera equipment. It also allows the site hospitals to store information sent to them by slow-scan. This method of storage is considerably cheaper than the purchase of a hard copy video printer. In addition to this it is also possible to use a stereo cassette recorder and record the video signal on one channel and a corresponding voice track on the second channel. A system could conceivably be built which would allow a health care provider to telephone the Telecommunications Information Network System and tape record the slow-scan signal to be played back at a later date through an expander unit.

The utilization of this system can have a direct and positive impact in improving the quality of care in the health care system. Since there are approximately 150 major medical centers in the United States this system has the potential to radiate from each center with the provision of medical information and the potential of linking medical center consultants with health care professionals in non-medical center areas.

Appendix D

From Modern Medicine/December 15, 1979

"!ycnegremE"

Have an ycnegremE?

For fast information,

Call T.I.N.!

Drug and Poison Information Center (DPIC) 872-5111
Telecommunications Information Network (TIN) Office 872-5545

From Modern Medicine/March 30, 1979

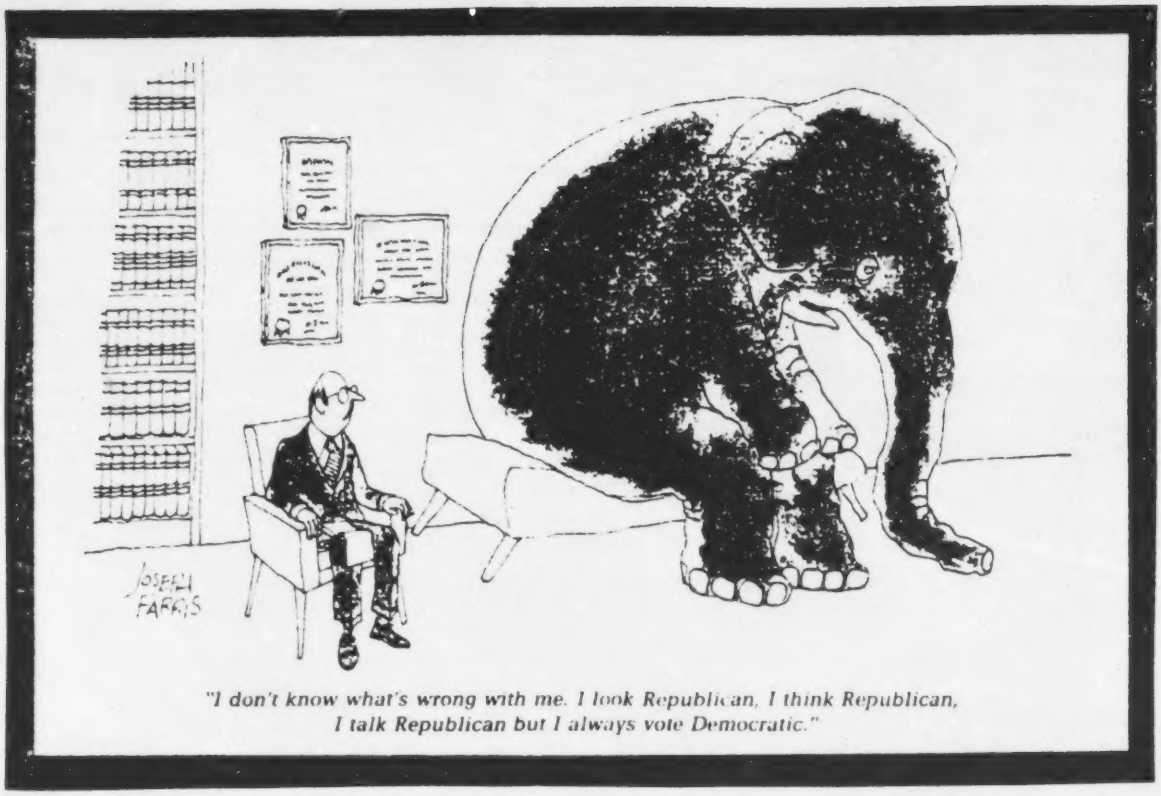
"Nine out of ten doctors recommend the chicken salad on rye."

WHAT DO OTHERS RECOMMEND?

Find out through T.I.N.!

Drug and Poison Information Center (DPIC) 872-5111
Telecommunications Information Network (TIN) Office 872-5545

from Modern Medicine/January 15, 1979



"I don't know what's wrong with me. I look Republican, I think Republican, I talk Republican but I always vote Democratic."

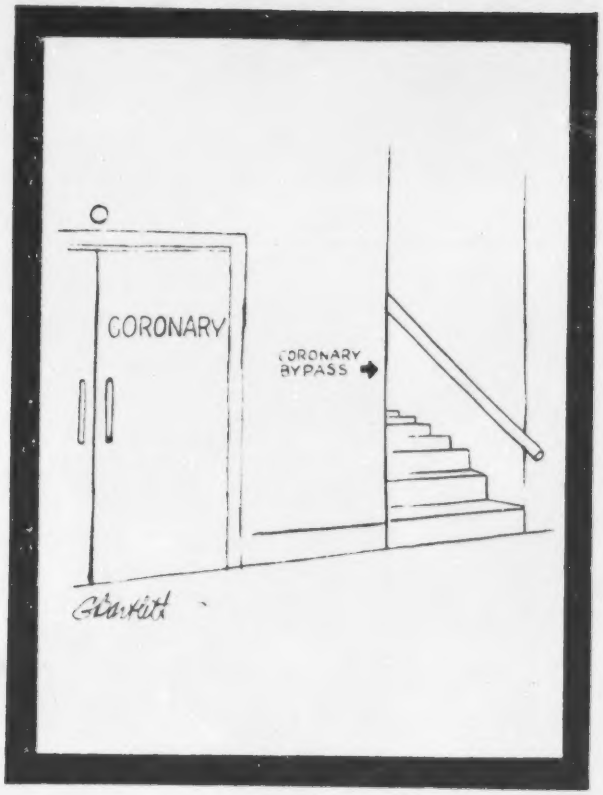
NEED HELP WITH

MAMMOTH QUESTIONS?!?

Use T.I.N.!

Drug and Poison Information Center (DPIC) 872-5111
Telecommunications Information

from Modern Medicine/September 15, 1979



Want the latest on coronary bypass?

CALL T.I.N.!

Drug and Poison Information
Center (DPIC) 872-5111
Telecommunications Information

From Modern Medicine/April 30, 1979

CHICKEN SOUP—

DOES IT REALLY WORK?

Use T.I.N. and find out!

Drug and Poison Information
Center (DPIC) 872-5111
Telecommunications Information

from Modern Medicine/November 30, 1979

"Mr. Gribbs, have you ever considered moving to a drier climate?"

Any unusual cases lately?

FOR INFORMATION, CALL T.I.N.!

Drug and Poison Information Center (DPIC) 872-5111
Telecommunications Information

from Modern Medicine/June 30, 1979

"We've got an additional problem. The water on your knee is also polluted."

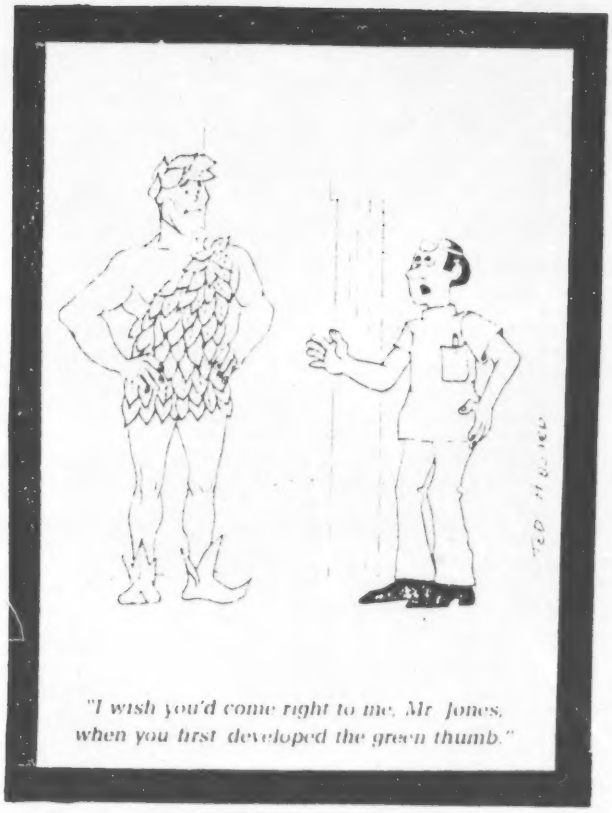
COMPLICATIONS?

For more information,

Call T.I.N.!

Drug and Poison Information Center (DPIC) 872-5111
Telecommunications Information

from Modern Medicine/March 23, 1979



"I wish you'd come right to me, Mr. Jones, when you first developed the green thumb."

AN UNFAMILIAR SYNDROME?

Find out about it through T.I.N.!

Drug and Poison Information Center (DPIC) 872-5111
Telecommunications Information

from Modern Medicine/May 30, 1979

"Jumper cables?"

Heard of an unusual treatment?

Check it out through T.I.N.!

Drug and Poison Information Center (DPIC) 872-5111
Telecommunications Information Network (TIN) Office 872-5545

Appendix E

PROJECT RELATED PRESENTATIONS AND PUBLICATIONS

Kues, John R. "Providing Information to Health-Care Professionals via Telecommunications: A Case Study." Presented at the 43rd Annual Meeting of ASIS (American Society for Information Science), Anaheim, California, 1980.

Kues, John R. "The Telecommunications Information Network: A Case Study Providing On-Demand Information to Remote Health-Care Sites." In Lorne A. Parker and Christine H. Olgren (eds.). Teleconferencing and Interactive Media. University of Wisconsin Press, pp. 255-261, 1980.

Lorenzi, Nancy M. and Kues, John R. "Getting the Available Information Quickly to Those Who Need It Most: A Worldwide Problem." Presented at the Fourth International Congress on Medical Librarianship, Belgrade, Yugoslavia, 1980.

McGuire, Melanie. "On-Demand Medical Information for Health-Care Providers via Telecommunications." Presented at the Annual Meeting of the Medical Library Association, Washington, D.C., 1980.

McGuire, Melanie. "Providing On-Demand Medical Information to Health-Care Professionals via Slow-Scan Technology." Presented at the Annual Meeting of the Ohio Academy of Science, Toledo, Ohio, 1980.